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# Timber and Trauma

## 75 Years with the Federal Forestry Service 1899–1974

Kenneth Johnstone

Forestry Canada
Forêts Canada

Canada

[redacted]

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Fire on the Spillmacheen River near Revelstoke, British Columbia, 1914.

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**Cover:** Cathedral Grove, Port Alberni, British Columbia. (Photo by Albert Potvin)

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# Preface

From where I sit at this typewriter, I can gaze out my window and enjoy the leafy presence of a row of venerable oak trees that shade me from the heat of the morning sun. Beyond them the eastern horizon is enclosed by a distant line of young elms, the line broken here and there by the gaunt, outstretched limbs of dead giants of their kind, victims of the dreaded Dutch elm disease, which will inevitably claim the offspring.

The breeze atop this ridge, which lies south of Quebec's Châteauguay Valley, comes mainly from the west and it blows unobstructed now, since my neighbor removed a stand of majestic sugar maples that was decimated by a cruel ice storm of a few seasons back and no longer provided a commercial reason for their continued existence. Felled, dismembered, drawn, and quartered, they are presumably now drying in a kiln awaiting dispatch to some furniture factory.

A dwindling procession of 100-year-old white pines, their tops long killed by disease, still stagger along my driveway. Each year I lose one or two to a combination of old age and the wind, but their ranks are constantly being replenished by youthful recruits, which flourish in a soil that is particularly hospitable to oak, elm, pine, and maple.

This district is part of the Great Lakes–St. Lawrence Forest Region. The hardwood stands in particular were famous in their day. But the land of the Châteauguay Valley was much too rich to be left to the forests, and in the early part of the last century the hardwoods were burned off by the settlers for the potash, often their only cash crop, which they lugged on their backs in sacks across the swampland of the lower valley to Montreal, 40 miles away. The few dollars they received bought the bare necessities of their frugal life. The mighty stands have long since disappeared, to be replaced by row upon row of symmetrical apple orchards, which also flourish in the gravelly soil that slopes up to the Adirondacks, just south of the border.

Living in the ravished countryside of southern Canada or living in the concrete confines of a large city where isolated green spaces gasp for life against the surrounding noxious fumes of industry and automobiles, it is hard to remember that Canada is still a forested country. Yet, indeed, the forests may prove to be one of our most valuable national assets.

Only now, belatedly, are our leaders beginning to realize what far-sighted ecologists have been trying to tell them for decades: among the most potent safeguards against pollution, filtering out noise and dust, providing life-giving oxygen, retaining the moisture in the soil and in the atmosphere, are the very trees that we have so casually accepted as part of a vanishing landscape.

But the forests are still there, in spite of the vigorous efforts of man, insects, disease, and fire to destroy them. The great Boreal Forest Region stretches from Newfoundland and Labrador in the East to the Rocky Mountains and the Yukon in the West, a continuous belt of conifers that includes white and black spruce, tamarack, balsam fir, and pine, with some mixture of white birch and poplar. Then there are the rich forest regions of British Columbia, four separate and distinct: the Coast, celebrated for its rain forests of western red cedar and Douglas-fir; the Subalpine, occupying the mountainous uplands; the Montane, a dry parkland forest of the Interior; and the Columbia, with its western red cedar and western hemlock.

The Great Lakes–St. Lawrence Region, characterized by the maples and the oak–ash–beech associations, extends through the highlands of Ontario and Quebec to the Acadian Region, which covers the greater part of the Maritime provinces. The Deciduous Forest Region of southwestern Ontario is notable for its black walnut, sycamore, hickory, and oak forests. Even the grasslands of Manitoba, Saskatchewan, and Alberta support several species of trees in great numbers.

It would be a mistake, therefore, to assume from the evidence around us in the populated parts of Canada that we have succeeded in destroying our forests. We have done our best, but we have not quite succeeded. One of the reasons we have failed is precisely what this story is all about; for it is essentially the story of a dedicated group who believed in the forests, who set out to protect them, conserve them, propagate them, and make the maximum use of their yield. They fought for that goal in good times and bad, with government support and, sometimes, with government neglect. They had their great moments of triumph, and they had their times of bitter failure. But they never lost sight of that goal.

Kenneth Johnstone (1909–1978) completed this manuscript in 1973 under contract with the Canadian Forestry Service.

# About the Author

Kenneth Johnstone was born in Macleod, Alberta, educated in Toronto, Ontario, and began his journalistic career in England where he served as London correspondent for *Time* magazine. During his lengthy career he was associated with the National Film Board and the Canadian Broadcasting Corporation, and contributed regularly to *Maclean's, Weekend, The Star Weekly, Family Herald, New York Times, Vogue,* and *Reader's Digest*.

His extensive writing experience included technical subjects ranging from mental health, architecture, mining, and resource management to gourmet cooking. He authored numerous articles on Canada's penitentiary system which were serialized in *The Montreal Star*. His most recent books concerned the management of Canada's fisheries resource: *The Vanishing Harvest* and *The Aquatic Explorers*, a history of the Fisheries Research Board of Canada.

Johnstone was a tireless advocate of responsible resource management. In his travels across Canada he was struck by the apparent lack of interest Canadians have for their forests, but he was greatly impressed by the dedication of forestry people and the absolute need for Canadians to develop a resource ethic for the management of their forests.

This was his last completed manuscript: a journalist's treatment of the first 75 years of what is now Forestry Canada. It does not follow any set rule of historical account but attempts to show how leadership, vision, and foresight, or lack of them, in our politicians and public servants can profoundly influence the course of events in the development and exercise of mandate at the federal level. It is interspersed with anecdotes, facts, records, and personalities of those who sought to manage and conserve the Canadian forests from a federal focal point. For the first time, records of the period 1899 to 1974 have been organized, providing a ringside seat in an arena of public administration that Canadians know virtually nothing about.

Kenneth Johnstone died in 1978. He was a strong advocate for forestry, a keen student of the politics of natural resources, and my good friend.

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# 1. The Roots

The people of Canada have never been enamored of trees or the forests of the country. On the contrary, from the time of the first settlers until now the forests have been seen as a threat, a barrier to progress, and, later, a resource to be exploited and laid waste. In the beginning, these views were justified. The forests stretched endlessly and thickly over the land, from Newfoundland and the Atlantic coast as far west as the settlers could penetrate, lining the banks of the St. Lawrence and beyond. In the impenetrable forests were the wild beasts and the dreaded Indians, who soon learned that these fair-skinned and bearded newcomers meant them little good. Driving back the forests meant driving back the enemy, depriving him of his cover, and frustrating his cunning ambushes. It also meant fertile land to till, and wood for buildings and fences, for cooking and heating in winter, for the construction of ships, and for the masts of the French and English navies.

Intendant Jean Talon tried to develop a trade in masts and planks for the French government; however, shipping problems, negligence, and poor liaison between authorities in France and in Canada prevented the effective exploitation of the rich timber resource of the colony. The English navy, in contrast, made good use of colonial timber resources from the start. Masts for the Royal Navy had been the earliest British demand on the forests of North America. As early as 1688, agents of the Crown began marking choice white pines in the New England forests with the broad arrow or "crowfoot," the mark of British government property. The same policy of reserving these "King's pines" for naval masts and spars was pursued in Nova Scotia from 1721, and from 1774 the timber growing in the Saint John River valley was similarly reserved.

The American Revolution ended the supply of masts and spars from New England, but at the same time it opened up the resources in the Saint John River valley as the country was settled with Loyalists fleeing from the new republic. Square timber had been shipped from Halifax as early as 1762, but by 1779 pine was being cut in the Saint John River reserves and the next year the masts thus obtained were used to refit British men-of-war at the Halifax dockyard.

A critical shortage of oak and pine for naval construction spread this development to the St. Lawrence, and Quebec became the base for the new trade in the early 1800s. The new Quebec timber trade was given a powerful impetus in the Napoleonic wars when the French closed the Baltic ports to British trade, forcing the British to depend more heavily on the colonies for supplies. However, it was not the war situation or naval needs alone that created and built the new timber trade. Rather, English timber magnates insisted on protection against the renewal of the Baltic trade before they were willing to invest capital in developing the Canadian source, because the freight rates across the Atlantic were three to four times those from the Baltic. The British government responded by placing prohibitive duties on Baltic timber while permitting colonial timber to enter duty free. Thus, by 1811, the timber trade in Canada was well under way.

The prosperous and expanding timber trade necessitated regulations. Initially, these involved the establishment of quality standards and sizes for export, and provided for the appointment of master cullers in Quebec and surveyors of lumber in Nova Scotia and New Brunswick. In 1826 regulations were drafted to include the payment of timber dues on wood cut on Crown lands, making the forest resources of the provinces of Upper and Lower Canada a source of revenue, thereby enabling the public to share in the wealth of the Crown lands. Until then the only persons authorized to cut timber on public lands were the contractors for the Royal Navy or those holding licenses from them. The monopoly had led to widespread abuse and was continually violated by unlicensed lumbermen, who pursued this profitable illicit trade despite all official attempts to suppress it. The monopoly of the contractors was terminated and a system was inaugurated allowing anyone to cut timber on the ungranted land on payment of a fixed scale of rates to the Crown. The proclamation, issued May 3, 1826 by Sir Peregrine Maitland, lieutenant governor of Upper Canada, established the scale of rates to be paid, specified minimum diameters of the timber, and exempted old licenses. Similar legislation was enacted that same year in Lower Canada and several years later in the two Maritime provinces. This legislation profoundly influenced the drafting of the British North America Act of 1867. It formed the basis for provincial retention of resources and revenues from Crown lands. It would also profoundly influence federal forestry operations for many years.

Timber revenues mounted as the lumbering business expanded. At Bytown (Ottawa), which had become the chief site of the trade, timber revenues in 1826 from both sides of the Ottawa River were $10 612. In 1836 it rose to $56 209, and in 1846 to $146 908. The desire to get into this booming business became intense, and the clamor against monopoly and for breaking up existing licenses was loud and insistent. The government of the United Provinces responded in June 1846 by publishing regulations for the granting of licenses.

Unfortunately, the new regulations, which stimulated production, came at the wrong time for the European market. Up to and including 1845, the timber trade with England had been flourishing. But, beginning in 1846, a depression set in, resulting from overproduction in Canada and decreasing demand in England. The depression continued into 1848, and in 1849 a committee was appointed to launch an inquiry into the timber trade. It produced its report that same year, and the government acted quickly. Within the year it introduced the Crown Timber Act, "An Act for the Sale and Betterment of Timber upon the Public Lands," which together with the accompanying regulations would prove a landmark in Canadian forest legislation, providing the basis for nearly all subsequent laws and regulations in Canada governing the issue of timber licenses.

Although these new regulations were intended to stabilize the timber trade, they failed to recognize the problems of settlement that were associated with the granting of lands for timber rather than for agricultural purposes. There was a constant problem of bogus settlers stripping the land of pine and oak timber and then moving on, leaving abandoned "farms" on land suitable only for growing trees. Although various parliamentary committees studied this situation, characteristic of both Upper and Lower Canada, the problem was never resolved.

On July 1, 1867, the confederation of the British North American provinces was created by the establishment of the Dominion of Canada. The British North America Act, in defining the respective power of the Dominion and provincial governments, included among the subjects exclusively within the scope of the provincial governments "the management and sale of the public lands belonging to the Province, and of the timber and wood thereon."

This referred in particular to the four eastern provinces of Ontario, Quebec, New Brunswick, and Nova Scotia. Manitoba, assisted by Louis Riel, became a province in 1870. British Columbia joined Confederation in 1871 because of the promise of a transcontinental railway. Prince Edward Island joined in 1873. Saskatchewan and Alberta were still part of the vast Northwest Territories and did not become separate provinces until 1905. Meanwhile, Crown lands in Manitoba and the Northwest Territories remained under the administration of the federal government and, between 1867 and 1873, were under the jurisdiction of the Secretary of State for the Provinces.

Then, on July 1, 1873, the Department of the Interior was created by act of Parliament and charged with two main responsibilities: the administration of Indian affairs and the administration of Dominion lands. When British Columbia joined Confederation, the province turned over a 64-km-wide (40-mile-wide) strip of land along the right-of-way of the Canadian Pacific Railway, together with a block of forested land in the Peace River District, to the federal government as payment for its share of the cost of constructing the line. This, too, was administered by the Department of the Interior.

The federal government continued to watch developments affecting the timber industry and to legislate for its improvement. It was too important a section of the young country's economy to ignore, even though the actual administration of the forests in the older provinces and in British Columbia was the responsibility of the provinces. The report of the Crown Lands Department of Canada for 1866 showed that $338 302 had been collected as timber dues and ground rent that year, and another $63 483 as slide dues (dues charged to drive logs through slides constructed over river obstructions). The total exports of forest products for the year ending June 30, 1867 were valued by the Trades and Navigation Returns at $13 948 648, compared with a total export value of $16 765 981 for agricultural products.

In 1868 the government launched an inquiry into the active trade in hemlock bark, which was used extensively in tanning leather. The inquiry led to the conclusion that the supplying of local tanneries with hemlock bark was legitimate but that the export of bark, principally to the United States, for use in foreign factories, not only threatened to despoil large areas of forest and increased the danger of forest fire, but also posed a serious threat to the local leather industry and deprived Canadians of employment. The committee recommended an export duty of "one dollar per cord upon Hemlock Bark, with a view to checking the wholesale destruction of our Hemlock forests now going on." It was a straightforward case and was resolved in typical Canadian fashion: no action was taken. There was no support in favor of the duty, and the despoliation of the hemlock resource continued.

In years past, the square timber trade had been condemned for its wastefulness, and the problems of settlers clearing land and starting forest fires by burning slash had been considered by many parliamentary committees. The timber trade and its ruthless exploitation of the resource were also the concern of Canada's first prime minister. On June 22, 1871, a historic and prophetic letter was written by Sir John A. Macdonald to John Sandfield Macdonald:

"The sight of the immense masses of timber passing my windows every morning constantly suggests to my mind the absolute necessity there is for looking into the future of this great trade. We are recklessly destroying the timber of Canada, and there is scarcely a possibility of replacing it. The quantity of timber reaching Quebec is annually decreasing, and the fires in the woods are periodically destroying millions of money. What is to become of the Ottawa region generally, after the timber is cut away, one cannot foresee. It occurs to me that the subject should be looked in the face and some efforts made for the preservation of our timber. The Dominion Government, having no lands, has no direct interest in the

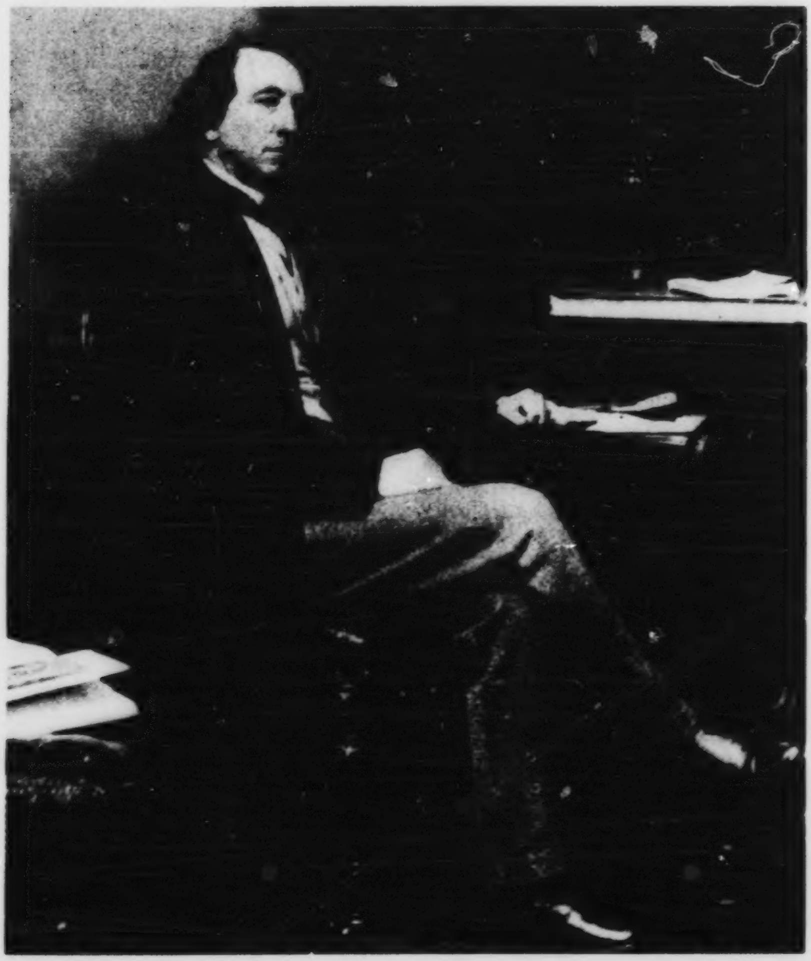


FIGURE 1. Sir John A. Macdonald. "We are recklessly destroying the timber of Canada. . . ." (From a letter written in 1871 and quoted in *Forest History*, Vol. XI, No.3) (W.J. Topley/National Archives of Canada/C 3207)

subject, but it seems to me that it would be a very good thing for the two Governments of Ontario and Quebec to issue a Joint Commission to examine the whole subject and report: 1st. As to the best means of cutting the timber after some regulated plan, as in Norway and on the Baltic; 2nd. As to replanting so as to keep up the supply as in Germany and Norway, and 3rd. As to the best means of protecting the woods from fires. The Commission would be a popular one if the men were well chosen, and their report, if drawn with care, would be of incalculable value. I think you might make a good strike by taking this subject up vigorously. . . ."

There is no record that such a commission was ever established. The provincial governments at that point were more concerned with collecting revenues from the timber than with conservation, and the popular view was that the forests would last forever.

# 2. Organizing the Service

Sir John A. Macdonald was not the first to express concern for the future of Canada's forests. The disappearance of the hardwoods and then of the pine forests of eastern Canada had been viewed with growing alarm both by conservationists and by individuals involved in the forest products industry, and on its formation in 1875 the American Forestry Association was able to enlist several influential Canadians. Among these were two stalwart conservationists, the Hon. H.G. Joly de Lotbinière and James Little of Montreal. Little's son, William, became a vice president of the organization, and the Canadian members were able to arrange for the American Forestry Congress of 1882 to take place in Montreal.

The congress, which lasted for 3 days (August 21–23), was held under the patronage of Quebec's Lieutenant Governor T. Robitaille, and Canadians participated actively in the proceeedings, attended by more than 200 delegates from the United States and Canada. A chief theme of the congress was the need to manage and conserve the forest resources. Possibly one of the most pertinent addresses was given by John Dougall, editor of the *New York Witness*, on the subject of "The Preservation of Forests from Wanton Destruction, and Tree Planting." He proposed that commissioners of woods and forests be appointed in the American states and in Canada.

The Canadian government's reaction to the congress and its proceedings was swift. In February 1884, J.H. Morgan was appointed as a one-man commission "to examine into and make a Preliminary report on the subject of the protection of the forests of the Dominion. . . ." Morgan immediately prepared his preliminary report to Deputy Minister of the Interior A.M. Burgess. He pointed out the disasters in ancient, medieval, and modern times that were associated with the destruction of the forest and discussed the duty of the government to adopt measures for replanting and for the introduction of a system of forest plantations on the Prairies. In addition, he recommended the appointment of a commission to deal with the question of forest protection and reproduction.

On July 7, 1887, Morgan was appointed commissioner of forestry with a mandate to report on the best methods of growing trees on the Prairies and "of preserving and protecting the forests in existence in the Dominion at the present time." Morgan's report appeared in the 1889 annual report of the Department of the Interior, and it was clear from its tone and Burgess's comments that Morgan and the department were on a collision course. He noted the successful efforts at establishing the plantations of forest trees made the previous season by the Department of Agriculture at the experimental farms at Indian Head and Brandon. He proposed that the various local governments in Manitoba and the Northwest Territories appoint commissioners who could meet with him to examine what was being done in the United States and to prepare a handbook on tree plantation as a guide for farmers and settlers. Calling for an overall plan that could be implemented by the federal and local governments, he recommended that the federal government begin a program of forest tree plantations through the Northwest Territories. Morgan strongly criticized the way forest fires were started in the railway belt by the failure to provide screens on the smokestacks of the locomotives; he warned about the need to protect against indiscriminate cutting and forest fires in the mountains at the headwaters of the major water systems; he emphasized repeatedly the need to establish "forestal experimental stations." This, of course, required trained and experienced foresters, and he went into considerable detail about the schools operating in Europe and how they were used by various governments. He wondered why this could not be done in Canada, since we were spending large sums on other projects that were not "of more pressing necessity than forest culture on the great plains of the North-West." Finally, after contrasting the advances made in forestry in the rest of the world with the lack of such developments in Canada, Morgan urged the Dominion government to warn the provinces regarding the destruction of the forests and take vigorous action in the Northwest Territories which were under its immediate control.

Burgess's reaction, contained in the same annual report of the department, was that no extra staff was needed for forest fire protection because there would be fewer fires as the country became more settled. Besides, trees reestablished themselves quickly in burned-over areas, as he had seen for himself. There would always be lots of wood for settlers. Reforestation was up to the Department of Agriculture. Clearly Morgan's many excellent recommendations would not be implemented, certainly not while Burgess represented the official government view.

Why was Morgan appointed commissioner of forestry in the first place and why were his numerous recommendations almost completely ignored? Macdonald had expressed concern for the forests and the American Forestry Congress had increased the pressure on the federal government to act. Morgan's appointment, even though a patronage appointment, as nearly all such appointments were in the last century, had been in response to pressure. Whether it had been made as a result of Macdonald's genuine concern about the forests or whether it was intended simply as window dressing by his regime is speculative. Certainly Morgan's reports showed that he took his job seriously, and his pioneer work was undoubtedly studied by the founder of the federal forestry service. But Macdonald was involved in a gigantic struggle over the building of the Canadian Pacific Railway and was probably not prepared to tackle problems in western Canada if he could postpone them.

There was another factor that may have contributed to rendering Morgan's role as commissioner of forestry abortive. The Department of the Interior, originally created to manage the Northwest Territories, gradually became a catchall with a wide variety of agencies and branches, often with little in common. One of its key roles was the disposal of Crown lands, which suddenly acquired great speculative value after the opening of the West by the CPR. The Liberals came to power in 1873 after the Conservatives under Macdonald had been driven from office because of the revelation of political payoff by the original CPR syndicate. In 1878 Macdonald returned to power and immediately continued with his national dream of a transcontinental railway. Land speculation in the West reached incredible proportions. Later the Liberals listed the names of 50 prominent Conservatives who had obtained 80-km (50-mile) timber limits free of charge from 1878 to 1896, while the Conservatives were in power. Thus, Morgan's proposals, including one that permanent forests be set up, were greeted unenthusiastically by the Conservative administration.

The Liberals would, in turn, be criticized for their handling of Crown timberlands in the Department of the Interior after the turn of the century. When they came into office in 1896, they brought with them Clifford Sifton, as minister of the Interior, a man from Manitoba who had a background of knowledge about the West and its forests. His father had been a farmer and a lumberman, and Sifton had firsthand experience in both areas. He was also determined to support his home province.

Sifton soon shifted Burgess into the post of commissioner of Crown lands and appointed James A. Smart his new deputy minister. In 1898 Sifton included in his annual departmental estimates the modest sum of $1000 to inaugurate an agency concerned with the protection of the forest resources of western Canada. His concern was by no means shared by all his Cabinet colleagues. Later he would say: "I had to talk half the afternoon to get it through!"

Just how serious Sifton and Smart were about forestry was revealed in Smart's preface to the 1899 annual report of the department. Under the heading "Tree Planting and Forestry" he said a bureau would be established to look after the preservation of the timber on Dominion lands and carry out policies to encourage tree culture in districts already open to settlement. To this end, Dominion Land Surveyor E. Stewart was appointed chief inspector of timber and forestry on August 15, 1899.

Elihu Stewart was born in 1844 at Collingwood, Ontario. In 1896, at the age of 52, he was an unsuccessful Liberal candidate in the North Simcoe, Ontario, riding, and in 1899 was appointed chief inspector of timber and forestry. This seems to smack of the political patronage typical of the period, but Stewart proved to be exceptionally talented. A more detailed biography, published in the 1936 "Annual Report of the Association of Ontario Land Surveyors," gives some idea of the remarkable versatility of the man. In 1896, the year he was defeated as a Liberal candidate for Parliament, he was elected by acclamation as mayor of Collingwood, Ontario.

He qualified as both a provincial and a Dominion land surveyor in 1872, and between that time and his death in July 1935 it "is doubtful if any land surveyor was entrusted so continuously with government surveys and inspections in his long career. . . ." His first survey for the Ontario government, in May 1875, was that of Machar Township, and his last, May 21, 1934, was a survey to reestablish original monuments in Nottawasaga Township.

From 1899 to 1907 he accomplished his most important work in forestry as superintendent of forestry for the federal government when he organized the federal forestry service and was a key figure in the organization of the Canadian Forestry Association. He enjoyed the confidence of Sir Wilfrid Laurier who frequently consulted him on forestry matters. When he left forestry he became managing director of a large Montreal lumber firm specializing in the sale of British Columbia timber. He then became one of the original owners and directors of the Spruce Falls Pulp and Paper Company at Kapuskasing, Ontario. He was one of the founders of, and a frequent contributor to, *Canadian Magazine* and served as a director of several British Columbia timber companies.

The West was not new to Stewart when he came to the Department of the Interior in 1899. In 1875 he was engaged on surveys for the Dominion government near Battleford, making the trip from Fort Garry by Indian pony and ox teams. When he offered his first report, which appeared in the 1899 annual report of the department, he already had a physical appreciation of his subject.

The report was 18 pages and began with an apology for its necessarily preliminary character because of Stewart's recent appointment. After acknowledging various sources from which he had drawn information, he plunged into his subject. He defined the lands owned by the Dominion:

"With the exception of the lands owned by the Hudson's Bay Company and what has

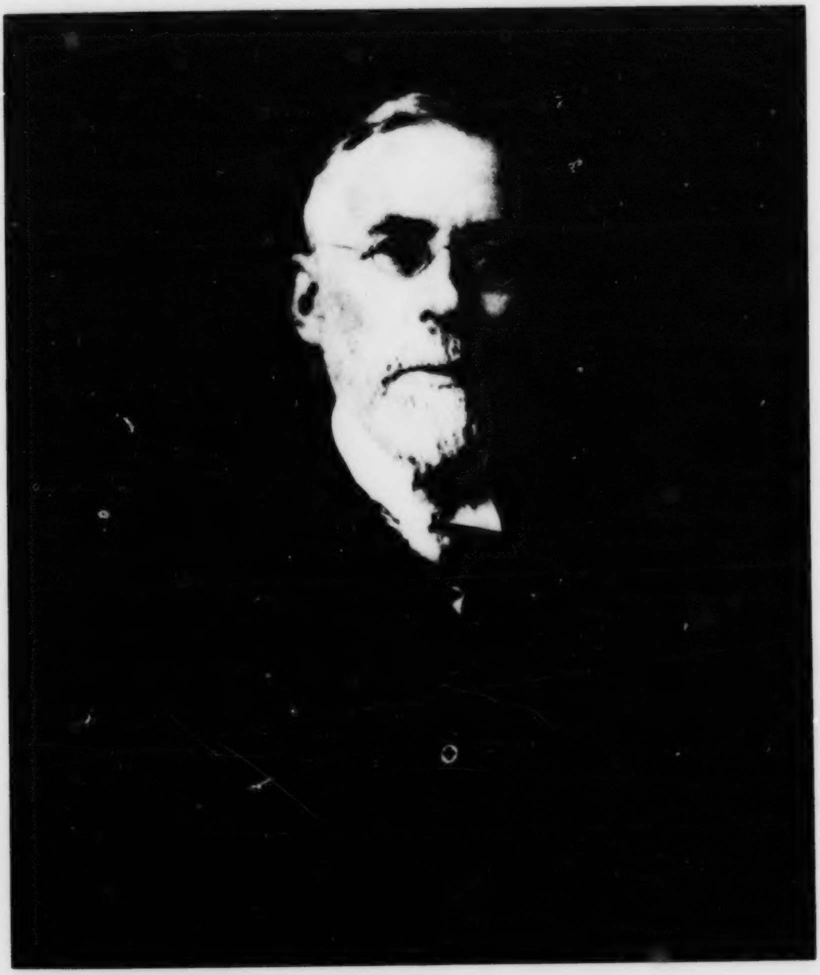


FIGURE 2. Elihu Stewart, superintendent of forestry 1899–1907. (National Archives of Canada, PA 91095)

been granted to settlers, railway companies, etc., the Dominion of Canada as distinct from the provinces owns and controls all the land in Manitoba and Northwest Territories and also a belt of forty miles in width along the Canadian Pacific Railway through the province of British Columbia. In addition to this the Federal Government is charged with the administration of the Indian reserves in the whole Dominion, including all the provinces."

He defined the timber areas of western Canada in broad terms and blamed human carelessness and irresponsibility as the prime cause of forest fires.

Examining the timber on the foothills south of the Bow River in Alberta, he called for a system of guardianship to protect this vital irrigation source from further devastation; and he proposed an organized fire fighting system, similar to what had been set up by Ontario and Quebec. It would pay for itself by protecting forests that would otherwise be destroyed by fire. Half the cost could be borne by timber-limit license holders.

Concerning forestry management, he regretted that scientific management of the forests of Canada and the United States had not begun earlier. He then listed what was being done regarding this in other major countries of the world and discussed exhaustively the subject of tree planting on the plains. He summarized:

"The whole forestry problem of our North-west may be included in two words: conservation and propagation. Conservation . . . of what we have at present growing in a natural state involves, first, preventing as far as possible, destruction by fire, and, secondly, a judicious system of cutting the timber required for use so as to retain for all time a continuous supply from those districts that are better adapted for the growth of timber than for agricultural purposes. . . .

"With regard to propagation . . . its importance is so great to the present settlers on the plains and so far-reaching in its effects to the country and to those who will in future make their homes there, as to warrant an earnest effort being made to encourage the planting of trees by the settlers. . . . The experimental farms are at present doing an excellent work in supplying seeds, cuttings and young trees to those settlers who make applications for them, but unless these people have a knowledge regarding their cultivation, . . . the trouble and expense are incurred to little advantage, and where failure is the result, it discourages others from attempting the experiment. . . ."

Stewart's report was applauded by Smart, who noted that the proposals originally made by Stewart for fire protection were already being implemented, and he promised the support of the department in the upcoming educational program devoted to prairie farm tree planting. He also praised Stewart's achievement in forming the Canadian Forestry Association, which was probably the single most important part of Stewart's report and one of the outstanding achievements of his career. His astute report on the Canadian Forestry Association was important to the future of Canadian forestry:

"Recognizing the importance of having the strength of public opinion behind the efforts that were being made to inaugurate and carry out a forestry policy suited to the varied conditions of the country . . . I took the liberty of inviting a number of gentlemen to meet at my office for the purpose of considering the matter of forming a Forestry Association. . . . A committee was appointed to carry out the proposition, and on the 8th of March a meeting was held in the railway committee room of the House of Commons, when a constitution and by-laws were adopted, officers appointed and several interesting papers on the subject of forestry read.

"It is exceedingly gratifying to observe the interest that this movement seems to have awakened in all parts of the country. In British Columbia, no doubt through the efforts of our esteemed president, who is now the lieutenant-governor of that province, a branch of our association has recently been formed . . . and on the other side of the continent, at the opening of the provincial exhibition at Halifax a few weeks ago, . . . the new lieutenant-governor of Nova Scotia, devoted a considerable part of his address to the subject of forestry, and made special reference to the aims of this association."

Then, no doubt tongue-in-cheek, Stewart concluded:

"Of course the association has no official connection with any branch of the government service, but it is believed that the deliberations and advice of such a body of men will be of great assistance to this branch in its efforts to inaugurate and carry out a judicious system of forestry in Canada, and with this in view the Department had rendered very valuable assistance to the association."

Stewart neglected to mention that at the first annual meeting of the Canadian Forestry Association, he had been elected secretary and that his colleague in the department, R.H. Campbell, had been elected assistant secretary and treasurer. This was a master stroke of political diplomacy and contributed significantly to the success that the fledgling Forestry Branch of the Department of the Interior was to enjoy during the next 20 years.

# 3. Tree Planting on the Prairies

Although it was not until the turn of the century that the Department of the Interior, through the new Forestry Branch, became officially involved in tree planting on the Prairies, the need for such a program was recognized since 1875, when Minister of the Interior David Laird called attention to it in his annual report. On learning that a tree-planting program had already been inaugurated in the United States (in Minnesota and the neighboring territories), he asked Surveyor General J.S. Dennis to investigate that program and make a report.

Dennis summarized the development of forest tree culture in the United States and also pointed out that the consumption of wood for fuel alone in Manitoba, on the basis of the existing population, required clearing 4000 ha (about 10 000 acres) annually, and that consumption would rapidly increase with the increased population expected on the Prairies. He called for "a liberal system of forest tree planting in Manitoba and the North-West Territories" and appended to his report a detailed two-page pamphlet entitled "Practical Suggestions on Forest Tree Planting." He obviously expected an immediate government entry into the program of tree planting on the Prairies. But it was not to be. A new minister held the Interior portfilio the following year, and other more pressing issues intervened. Tree planting disappeared from the government's agenda for a quarter of a century. But by 1901 the department was getting into stride on its tree-planting program, and Smart stated clearly in the 1901 annual report that Stewart had his full support.

Stewart, in forming the Canadian Forestry Association, had shown an acute political sense, which was also evident in his 1901 report, "Tree Planting on the Plains." Here he set out to demolish opposition that had developed towards the new government policy. Much of this opposition stemmed from commercial nurseries that saw a lucrative market on the Prairies disappearing because of the offer of technical assistance and free planting stock by the federal government. Stewart framed his arguments persuasively, intending to have them used as ammunition against the opposition. He stated at the outset that tree planting was indeed an essential part of government policy. Then he examined the case against the policy:

> "Exception has been taken to the policy of assisting the settlers on the open prairie in the growth and cultivation of shelter belts and forest plantations. . . . If it is wise to expend money in instructing the people in the growing of grain or grasses, which can only be of benefit to the individual who grows the same, surely it cannot be contended that it is unwise to do so in the growing of trees which in addition to the benefits they confer on the owner or occupant of the land on which they grow are beneficial in various ways to the whole community."

He then pointed out that the Dominion government received revenue from the timber sales in Manitoba and the Northwest Territories that justified expenditures in those areas; such expenditures by the federal government would not be justified in the old provinces, where the revenue from timber sales went to the provinces, which were beginning to follow the federal government's lead in reforestation. We were simply catching up with European forestry policy. Even Russia was ahead of us, and now the United States was taking action. Other methods of encouraging planting had been tried but were not successful. The present method was one of cooperation with the settler and it was the only method that would work.

He praised the experimental farms at Brandon and Indian Head, which "have been doing excellent work in experimentation," and then referred to a circular that had been widely distributed in the prairie districts, setting forth the new government policy. It informed the settlers that the Forestry Branch of the Department of the Interior was prepared "as far as the means at its disposal will permit" to assist settlers in the growing of forest plantations and shelterbelts. It also offered federal cooperation with municipal corporations, railway companies, and other similar corporate landholders "for the purpose of assisting them in growing trees along the public highways, railway tracks, and in streets and parks in cities, towns and villages."

One wonders how Stewart ever lost the 1896 election in Ontario! Always the political strategist, he recounted how, before making a public announcement of the new policy, "I made a visit to Manitoba and the North-west, and had the opportunity of attending about twenty meetings in the country where an outline of the scheme was laid before the people and discussion invited regarding it. These meetings were well attended throughout, and the line of action proposed met with such favour as to warrant the department in taking active measures to carry it into effect."

The first report of Norman Ross, Stewart's assistant, describes the type of assistance the department provided. It is a historical document considering accomplishments of the past 70-odd years in prairie tree planting and how the grim face of the plains around many farms and hamlets has been softened and altered by that program. It is a simple, practical document, stating forth plainly what was done. Addressed to Stewart, it was dated at Indian Head, September 16, 1901:

> "When visiting applicants I inspect the ground which they wish to plant up, to see that it is in suitable condition for growing trees, and also to note which varieties are best suited to the soil and locality, and, where necessary, make a rough sketch or plan to show the manner in which the trees are to be planted out.
>
> "The inspection of the ground before allowing trees to be set out is, I think, one of the most important features in the present scheme. At least 50 per cent of the settlers visited have, at one time or another, attempted to grow trees around their buildings, and in most cases the lack of proper preparation of the soil in the first place is to blame for the non-success attending their efforts. . . . The prevailing idea is that trees should grow anywhere so long as their roots are in the soil, but unluckily this does not hold good on the prairies. . . . A few minutes' conversation with these men is much more instructive to them than the reading of circulars to which many do not seem to pay much attention."

During the first 5 years of the program over 5 million seedlings were distributed from the nurseries at Indian Head and Brandon. The story of the tree-planting program from this point until the conclusion of the period in 1920 was most successful. Norman Ross built a team under his leadership that included such men as Roland D. Craig, Hugh Claughton-Wallin, A.P. Stevenson, Archibald Mitchell, Angus Mackintosh, John C. Caldwell, A.H.D. Ross, and F.W.H. Jacombe. They visited the Prairie provinces, inspecting farms, showing farmers how to prepare and develop shelterbelts and woodlots, and spreading the story of the program throughout the Prairies. They took part in exhibitions and spoke to Farmers'

Institute meetings whenever they could find a platform. In 1905 some 1 860 000 seedlings were distributed, almost half of these coming from the experimental farm at Brandon — its last contribution to the program. By 1906, 7 million seedlings were being distributed to 3700 farmers.

In 1907 the versatile Stewart resigned to head a Montreal lumber company, but the

FIGURE 3. Mr. J.J. Ring and the trees planted on his prairie farm at Crystal City, Manitoba, 1919. (Forestry Canada)

FIGURE 4. Sowing tree seed at Indian Head, Saskatchewan, 1909. (Forestry Canada)

program did not falter with his departure. He was succeeded by R.H. Campbell, his associate in both the Forestry Branch and the Canadian Forestry Association. Craig and Claughton-Wallin also left, although Craig would later return to the branch. In that year nearly 2 million seedlings were distributed to 3328 settlers. By 1908, the total distribution had reached 11 million seedlings. In 1909 a new record was reached of 2 574 375 seedlings distributed to 2010 applicants. During the next few years, the figures were: 1910 — 2 533 600 seedlings distributed to 3173 settlers, 3823 new applicants; 1911 — 2 636 100 seedlings distributed to 3285 settlers, 2656 new applicants; 1912 — 2 729 135 seedlings distributed to 3618 settlers, 1649 new applicants.

Ross warned that the capacity of the Indian Head station had been reached; so in 1912 the branch bought a further section of land at Sutherland, near Saskatoon, and the new station entered the program in 1913. The figures climbed steadily from that point: 1913 — 3 495 375 seedlings to 3526 settlers, 1898 new applicants; 1914 — 3 685 455 seedlings to 3420 settlers, 1559 new applicants; 1915 — 3 730 375 seedlings to 3459 settlers, 3693 new applicants; 1916 — 4 460 600 seedlings to 5172 settlers, 2853 new applicants. Incredibly, in the last 2 war years, the program reached its peak: 1917 — 7 664 925 seedlings to 4627 settlers, 1454 new applicants; 1918 — 8 400 000 seedlings to 4561 settlers.

The number of new applicants was not reported in the 1918 annual report of the department. The size of the annual report was cut drastically that year and never again reached the size it attained in 1914, when it was published in two thick volumes. Campbell reported that it had been a poor growing season for seedlings and that production would have to be cut back the following year. So it was that in 1919 merely 5 765 000 seedlings were distributed to 4388 farmers, the to-date distribution figure thus totalling more than 50 million seedlings. In 1920, the last year of the period, owing to "weather and labor conditions," the total was reported as 4 377 950 seedlings distributed to 4501 farmers.

Altogether, it was a remarkable record. The degree of cooperation between farmers and a government agency was attested by the success of the program as well as by the volume of appreciative correspondence that flowed from the farms into the office at Indian Head. Campbell, in this 1913 report, noted that "the tree planting on the farms on the prairies was the first work taken up by the Forestry Branch and it remains one of the most important."

The Tree-Planting Division made a vital contribution to the record of the golden years of the federal forestry service, for it showed politician and public alike tangible results for the spending of public funds — not an easy achievement at any time.

# 4. Rallying Public Opinion

Despite the many activities and the considerable travelling involved in setting up his fledging branch, Elihu Stewart never lost sight of the essential task of keeping the public informed about the kind of problems that existed in forestry, and the specific areas where public support was needed. He saw the Canadian Forestry Association as a means of developing national support for an enlightened policy.

Thus, in his 1901 annual report, he wrote of the Canadian Forestry Association, of which he was secretary:

"The association is now firmly established and . . . embodies in its membership a good list of leading citizens from all parts of the Dominion. . . . The influence of such men on public opinion with reference to correct forestry methods in Canada must necessarily be of benefit to the people of every section of the Dominion and fully justifies the department for the assistance it has given in furthering the interest of the organization."

During the years he served as superintendent of forestry, Stewart continued to use the Canadian Forestry Association as a sounding board and a political lobby group for his expanding forestry program. There was nothing small in his vision of Canadian forestry. He recognized that the forests controlled by the Dominion covered nearly 2.5 million km$^2$ (1 million square miles), three-fourths of which was not adapted for agriculture and consequently should be left for the growth of timber. The vast northern forests of spruce, extending as a zone from ocean to ocean, if properly protected and utilized, would be the world's main supply for timber in time of scarcity. Estimates of the quantity and quality of timber were required to plan for future timber and pulp utilization. This northern forest could provide employment for a considerable population, and with proper management would continue to be a permanent source of wealth to the country. He explained the methods used to implement this plan:

"The practice of setting aside and reserving certain tracts for timber purposes, known as timber reserves, has been in force for some time, but the object of intelligent forestry is not simply to preserve the forest, but to utilize it so as to produce the greatest benefit to the public. . . . Any timbered districts unfit for agriculture should be so set aside. As soon as possible these reserves should be carefully examined and an inventory taken of the different varieties of timber growing on each reserve, and also of the dead timber. Regulations should then be made to suit each individual case and carried out under the supervision of the Forestry Branch. A commencement has been made in this direction. . . ."

So Stewart staked out the ground for future activity by the Forestry Branch. He continued to carry his forestry message to the public by writing numerous articles on forestry for newspapers and magazines and lecturing extensively throughout Canada. The first official publication of the branch, however, was *Tree-planting on the Prairies of Manitoba and the North-west Territories*, by Norman M. Ross, which appeared in 1904. It consisted originally of about 40 pages of text, together with numerous illustrations, and was intended to provide practical information for settlers on the best methods of propagating, planting, and managing trees for shelterbelts, windbreaks, and plantations.

The following year, always seeking to expand the basis for forest management in Canada, Stewart travelled to Europe in search of information. He visited the forests of Germany and France and also the forest schools at Cooper's Hill in England, Nancy in France, and Munich in Bavaria. He reported that conditions were so different in Europe from those in Canada that it would be unwise at that time to adopt their methods, although much valuable information could be obtained from them. Then he made his proposal:

"It is, however, necessary for us to have skillfully trained men, and at present, as we have no forestry schools in Canada, we are compelled to engage those who have been educated in other countries. I believe the day has now come when a number of practical foresters would find employment in Canada if they had an opportunity of gaining a technical knowledge in a home forestry school and a practical knowledge by spending their winter vacations in our lumber camps. In addition to those who would obtain employment by the governments of the Dominion and the provinces, the lumbermen of the country would probably find it to their advantage to employ such men to examine their timber limits and make recommendations regarding the cutting of them and in many cases to superintend the work. The establishment of a forestry school, combining theoretical and practical instruction, should be the next step in our educational advancement."

It was more than a coincidence that the University of Toronto offered the first Canadian forestry course in 1907, and the University of New Brunswick followed suit in 1908. Stewart's implied promise of federal employment for graduates of such schools was faithfully kept by his successor, R.H. Campbell, when Stewart resigned in 1907.

After his proposal for the establishment of a forestry school, Stewart considered the future aims of those entrusted with his work: "Whatever is done to-day should be on a plan capable for development in the future. We have only made a commencement in a vast field."

Thus was the nucleus of the Forestry Branch program of public information and education developed under Stewart's guidance. It continued along these lines, and later official branch publications spread the message. A unique rapport was developed with the public that lasted as long as the branch was strongly interested in maintaining it. When other factors intervened, the interest of the branch in maintaining that rapport slackened, producing disastrous results for the branch. Meanwhile, the branch flourished operating under Stewart's guidelines.

# 5. Forest Protection: Forest Management

Stewart summarized the role of the Forestry Branch in two words: conservation and propagation. Conservation began with fire fighting; propagation began with the tree-planting program on the Prairies. He had wasted no time in initiating the first steps on both fronts. In his annual report for 1900, he announced that "steps are now being taken by which fire rangers will be employed; generally under the supervision of the Crown timber agents for the district at such times and places as they consider their services necessary." He commended the North West Mounted Police for their active role in fire fighting and recounted the results of meetings he had held with the officers in charge at Regina, Prince Albert, Calgary, and Macleod River.

The following year Stewart reported that a system of forest fire guarding was in force,

FIGURE 5. Forest ranger Ferguson warning campers about fire, Cypress Hills Forest Reserve, Alberta, 1908.

and he explained how the system worked. Forest fire rangers were selected from men residing in or near the district where they were to be employed. They were under the direction of a supervising officer, who was usually the Crown timber agent, a regular forest ranger, or a homestead inspector for the district. When this officer felt that fire rangers were needed, he notified them, provided them with copies of the fires act, a copy of general instructions defining their duties, and a supply of notices for posting and distribution to warn the public against the careless use of fire. The fire rangers provided their own horses when these were required and in such cases they were paid $3 a day. When the supervising officer felt the fire danger was over, he recalled the ranger and instructed him to make out his account, which the supervising officer certified and then forwarded to the department together with a daily diary showing how the fire ranger had been employed. Thus the fire ranger was employed only when there was a fire danger; in wet seasons he was often not employed at all.

By 1903, 22 forest fire rangers were regularly employed: 8 in the railway belt, 2 in western Alberta, 2 in the Edmonton district, 1 in the Prince Albert district, 7 in Riding Mountain and Duck Mountain, 1 in Turtle Mountain, and 1 in the Moose Mountain Forest Reserve. In addition to these, temporary help was engaged to fight specific fires. The following year the number of forest fire rangers regularly employed jumped to 40, and another 12 were employed on the east slope of the Rocky Mountains between the international boundary and the North Saskatchewan River.

Despite an unusually dry season, the system kept losses down and those fires that did break out were quickly brought under control. The system was working effectively. By 1906 Stewart's reports on "fire guarding" had become almost perfunctory. The system was established. It had proved itself and no longer required elaborate explanation to justify its existence.

Stewart had another major target in his sights — forest management. As far back as 1901 he had been agitating for increased timber reserves:

> "There is no work at present demanding greater attention than that of selecting and setting apart certain areas of the country for the production of timber. . . . The true policy for any country like Canada, having still in its possession large areas of ungranted lands, would certainly be to explore the country in advance of settlement and then divide it according to its character into agricultural, timber and mineral lands. The agricultural lands can then be dealt with as seems wisest, for agricultural purposes, and the mineral lands for mineral purposes, but when we come to the timber areas we find that the utility of the forest is at least two-fold — first, for the merchantable value of its products, and secondly, on account of the functions it performs in modifying the climate in the distribution of moisture . . . and causing a more even flow to the rivers and streams. . . . A sound forest policy is one that recognizes the elements of growth and decay and takes means to harvest the crop at maturity, and even on those reserves whose chief value is in forming a natural water reservoir, there is no reason why the mature timber should not be cut, and it will be a matter for consideration as to the best policy to adopt in this respect. . . ."

By 1903 he estimated that the timber on Crown land was worth about $192 million to the government in potential royalty, and that "if we confined our cutting of sawlogs to all trees above twelve inches at the butt and pulpwood to say seven inches, the annual increment of growth fit for use will be no less than 140 feet broad measure to the acre, or an annual growth increment equalling 13,440,000,000 feet, which at the above rate of $1 per thousand stumpage would give a perpetual annual return equal to $13,440,000."

In 1906, Stewart's last full year as superintendent of forestry, he achieved several goals. Tree planting on the Prairies was well launched. The system of forest fire protection was effective and its worth was well recognized. Measuring the resource in the reserves, begun in Turtle Mountain, had extended to Moose Mountain and now would continue in Riding Mountain and Cooking Lake. Propagation, originally confined to prairie tree planting, began modestly with 10 000 coniferous seedlings in the Spruce Woods Forest Reserve east of Brandon in 1904 and, having proved successful, was extended in 1905 and in 1906, to 13 000 and 17 000 Scotch pines, respectively.

The two events that crowned Stewart's career as a public servant before he returned to private life as a lumber merchant were the first Canadian Forestry Convention, held in January 1906 in Ottawa at the call of Prime Minister Sir Wilfrid Laurier, and the passing of the Dominion Forest Reserves Act, which removed some 13 965 km$^2$ (5392 square miles) from sale, settlement, and occupancy and officially turned over the management of these reserves to the Forestry Branch.

The reason for Stewart's retirement from government service is not given in any published documents, but his example would be followed by other highly capable forestry figures, most notably by H.R. MacMillan, who a few years later would leave federal and provincial service to found the MacMillan Bloedel wood-products empire. Stewart left a small but well-organized branch. His successor, R.H. Campbell, was a close associate and shared his vision for the future of forestry in Canada.

Stewart concluded his own personal branch activity in 1906 with a remarkable feat: a trip down the Mackenzie River as far as Fort McPherson, near the arctic, and a return via the Porcupine and Yukon rivers. He found the basins of the Athabasca, the Peace, and other tributaries of the Mackenzie, as well as the valley of that river itself, to contain vast quantities of timber, of which the spruce was the largest and most valuable variety. His resignation took effect on March 1, 1907.

Elihu Stewart was a man of vision and action. Promoter and confidant of a prime minister, he had the ability to sell forestry to the public and the politician alike. In carrying out his program, he established an organizational framework for the continuing development of forest management in Canada. Men like Stewart are rare in any land, and forestry in Canada blossomed under his guidance.

# 6. The Forward Thrust

The two major events that ushered in R.H. Campbell as superintendent of forestry placed formidable tasks before him that required all his energies. He and Stewart had played key backstage roles in both events of 1906 — the Canadian Forestry Convention and the Dominion Forest Reserves Act. Sir Wilfrid Laurier called for the convention and he was its president. Stewart was on the executive committee and R.H. Campbell was its secretary.

The convention itself was an expression of the general awareness by government, the forest industries, and the concerned public of the growing importance of the forests and their preservation for the future of the country. It was held in the Railway Committee Room of the House of Commons from January 10 to 12, 1906, and 276 delegates took part. More than 50 different contributions were made by speakers, ranging from forest fire to forest and irrigation, the lumber industry, and the pulp and paper industry. The Committee on Resolutions was chaired by Stewart. The first resolution was concise: "Resolved, that the time is now ripe for a general forest policy and that the Federal government be asked to inaugurate the same." Sixty-eight years later, there would still be no federal answer to that request.

Another resolution urged the withdrawal of unsuitable agricultural land from settlement to be permanently reserved for the production of timber, that present reserves be added to, and that timber cutting on such reserves be done under proper supervision to ensure the reproduction of the forest. Increased fire-ranging systems were called for, and the necessity of conserving the timber on the watersheds was emphasized. It was proposed that in the older, settled parts of the country farmers be encouraged to replant wasted land and that the provincial governments provide assistance similar to that which the federal government provided for the prairie farmers for this purpose. The convention called for proper fire protection along railway lines when such lines cut through wooded areas, both along present lines and in the construction of new ones. It called for the replacement of the axe by the saw in cutting to decrease waste. It also suggested tax relief to encourage replanting of wasted areas.

In his conclusion to the convention, Laurier said, in part:

> ". . . We are dispersing now. Our labours are at an end — no, I am mistaken, our labours are just commencing. It is not sufficient for us to say that we have done our work, that it is completed. Again, I repeat, it is only commencing. We have worked as a collective body. It becomes every one of us now to work individually and singly and I desire every man in this audience as he goes away to his home and to his own avocation to become a missionary in the work of forestry. It is not sufficient that we should feel strongly upon this subject. Unfortunately we have to remember that the Canadian people at large have been too indifferent in the past to it. We must interest the nation, interest the individual, the farmer, the settler, the lumberman, everbody in the great work which is involved in forestry. . . ."

The Dominion Forest Reserves Act, which placed some 13 965 km$^2$ (5392 square miles) of forest reserves under the management of the Forestry Branch, was followed by an order-in-council that provided regulations for the cutting of timber in the Riding Mountain, Duck Mountain, and Porcupine Hills forest reserves. Only settlers living within 80 km

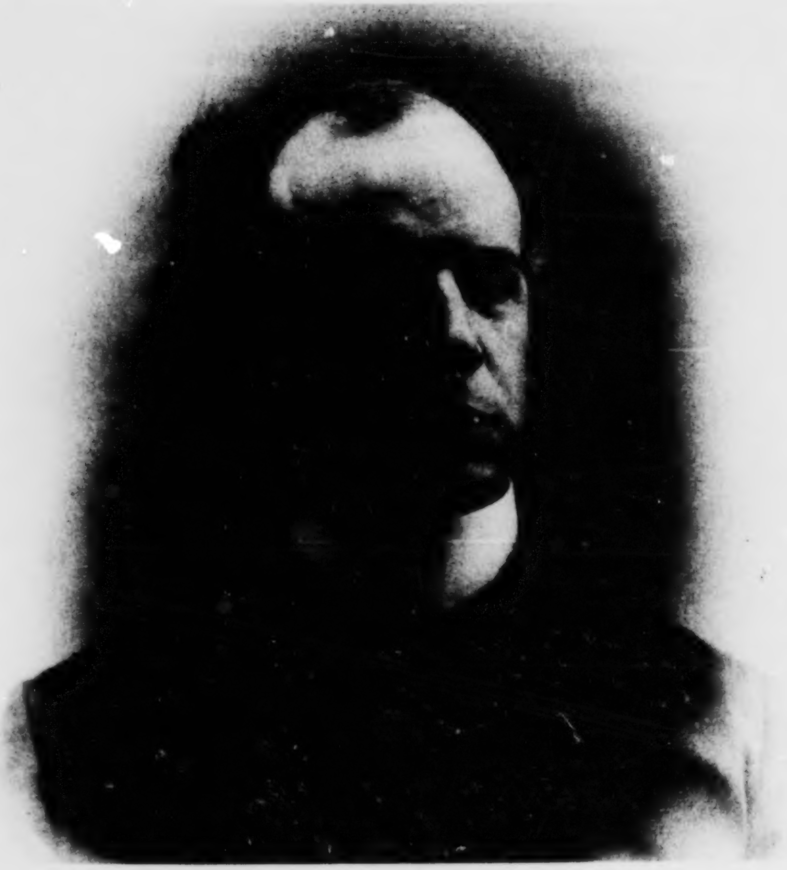


FIGURE 6. Sir Wilfrid Laurier " . . . our work . . . is only commencing." (From a speech given at the Canadian Forestry Convention in 1906, Forestry Canada, Historical Information, Central Registry, File No. 25-2-0) (National Archives of Canada/C 18857)

(50 miles) of the reserves would be entitled to cutting permits, and the timber they cut was to be for their own use rather than for commercial purposes. The dues payable were regulated to encourage the removal of dead timber and the less valuable species. General regulations for all the forest reserves were prepared.

In the Department of the Interior, Campbell had been in charge of the administration of timber lands outside the forest reserves as well as the grazing lands. This continued when he moved into the Forestry Branch, and irrigation was added in the 1st year of his administration. Campbell's vision for the branch was clearly as broad as Stewart's.

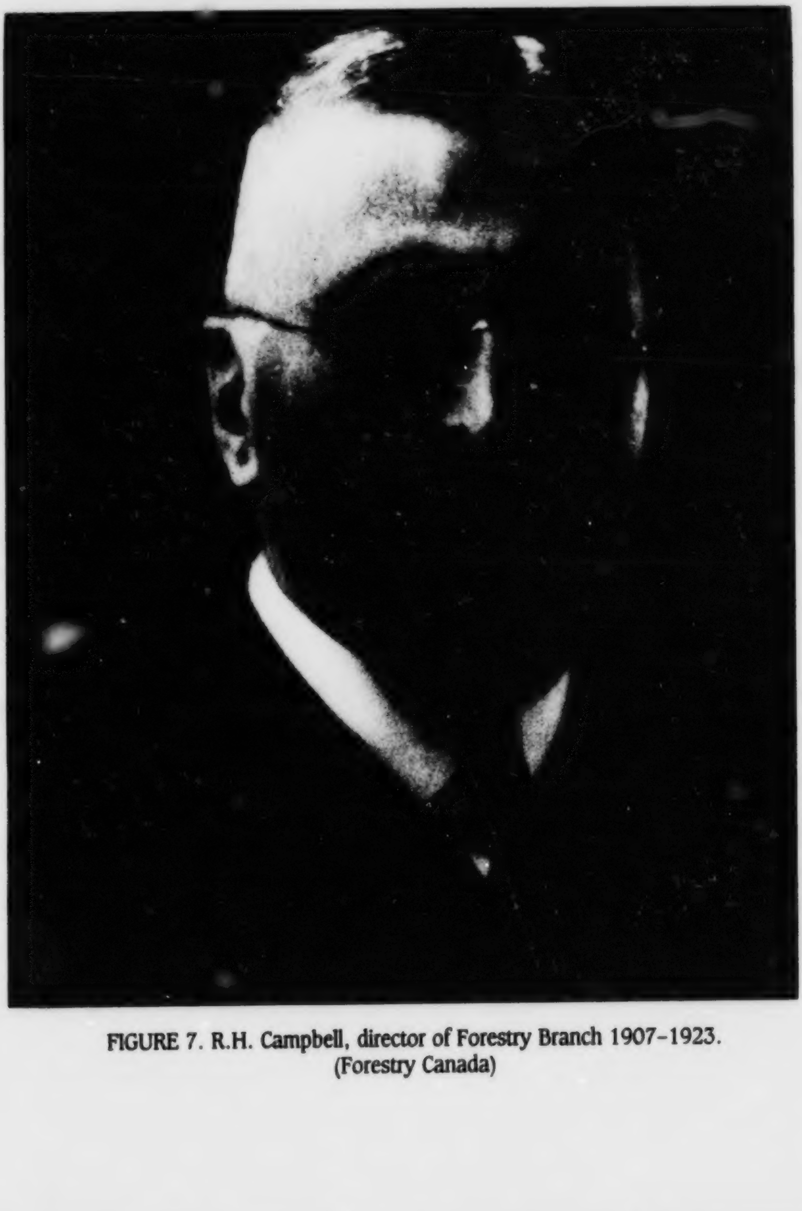


FIGURE 7. R.H. Campbell, director of Forestry Branch 1907–1923.
(Forestry Canada)

It is a truism of government, however, that the vision of public servants is only as effective as the existing political, social, and economic climate permits its realization. Morgan, too, had a vision a quarter of a century earlier, but the climate then had not been ripe for its realization. Now, however, the climate had altered favorably, and the new Forestry Branch was quick to take advantage.

Robert Henry Campbell, who now headed this trust, was born at Ailsa Craig, Ontario, in 1867. He entered government service at 20 and received all his training in that service. Promotion came rapidly, from secretary of the deputy minister to secretary of the minister of the Interior, then chief of the Timber and Mining Lands Branch until 1907.

An early convert to the cause of forest conservation, Campbell had worked closely with Stewart in the formation of the Canadian Forestry Association, at first serving as assistant secretary and treasurer. He succeeded Stewart as secretary in 1904 and became editor of the *Canadian Forestry Journal* in 1905. He was an active director of the association from its foundation in 1900 until his death in 1925. He was active in the formation of the Canadian Society of Forest Engineers and became its first elected vice president. He was also a member of the American Forestry Association, the American Association for the Advancement of Science, the Western Irrigation Association, and the Ottawa Field Naturalists' Club. He may also have been the most far-sighted leader of the federal forestry service.

A colleague of Campbell's, Professor Theodore Woolsey Dwight of the University of Toronto, wrote on April 13, 1937:

"R.H. Campbell, not only provided employment for early forestry graduates but was responsible for placing recent graduates in the key positions in the Dominion Forestry Branch. He appointed H.R. MacMillan assistant director a year after he graduated. [D. Roy] Sandy Cameron was appointed District Inspector of Forest Reserves in the Railway Belt of B.C. on his graduation, and Finlayson, Inspector in Alberta a year after he graduated. [Finlayson would succeed Campbell as chief of the Forestry Service. Cameron would head the service later. K.J.]

"In addition 7 or 8 foresters were appointed Forest Supervisors and employment given to all available students, even if jobs had to be made for them. I remember him saying that the men would never get the necessary field experience if they were not given an opportunity. In my opinion, he did more than any other individual to get the schools off to a good start and establish the profession of forestry in this country. . . . The following table is eloquent testimony to what he did. It depicts the results of Mr. Campbell's having made the decision that the Dominion Forestry Branch should be organized with professionally trained foresters in its supervisory positions. This decision was reached as a result of his early association with the Canadian Forestry Association. . . ."

| Year of graduation | Total no. of grads. | Number receiving their first employment with the Dominion Forestry Branch |
|---|---|---|
| 1909 | 1 | |
| 1910 | 2 | 2 |
| 1911 | 4 | 2 |

*Cont'd*

*Concluded*

| Year of graduation | Total no. of grads. | Number receiving their first employment with the Dominion Forestry Branch |
|---|---|---|
| 1912 | 9 | 8 |
| 1913 | 11 | 9 |
| 1914 | 7 | 5 |
| 1915 | 7 | 5 |
| 7 yr | 41 | 31 |

This table refers to graduates from the University of Toronto School of Forestry. Dwight added: "University of New Brunswick graduates received equal treatment. A record was kept of every student at both schools from the time of his first enrolment."

Campbell used his forestry school graduates to good effect. By 1911 the branch had advanced its work of surveying and determining land that was not suitable for agricultural purposes to the extent that an additional 47 534 km² (18 353 square miles) were identified as potential forest reserves.

The western reserves established in the first decade of this century were of two main types. The first was composed of small areas like the Spruce Woods and Turtle Mountain forest reserves in Manitoba and the Moose Mountain, Manitou, and Dundurn forest reserves in Saskatchewan. The second type of reserve was composed of the larger areas dominating the main watersheds such as the Riding Mountain and Duck Mountain reserves in Manitoba, the Porcupine Hills and Big River reserves in Saskatchewan, and the largest of all, the Rocky Mountains Forest Reserve in Alberta, established in 1911.

Some of these areas were little more than great sand piles. After the adoption of practices from Europe and, more recently, from the United States, the objective of successful reforestation became the goal. The 1905 and 1906 experiences had shown that valuable species like jack pine, Scotch pine, and spruce could be grown there as well as the less valuable poplar, and a vigorous program of reforestation was launched.

The plan for administering these areas called for the appointment of district inspectors of forest reserves for each province and a supervisor, aided by a technical assistant, in charge of each reserve. There would also be several permanent forest rangers, varying in number according to the size and needs of each reserve. The inspectors would be chosen for their technical qualifications and administrative ability. The supervisors were also required to have technical qualifications, and their assistants were required to complete a course at a forestry school. In the following 6 years, as the administration of the forest reserves was built up, the branch expanded its staff to include 10 supervisors, 4 technical assistants, and 97 forest rangers. By the time the Dominion Forest Reserves and Parks Act was passed in 1911, a total of 6.5 million ha (16 million acres) of forest land was controlled directly by the branch.

The nature of the work on the established reserves was primarily protective. In addition to maintaining patrols and posting fire notices around the area, the authorities built up a system of roadways, trails, and telephone communications and located ranger cabins and lookout towers at key points. The branch also supervised lumber operations completed on the reserves. This required cleaning up debris in the wake of these operations to reduce fire hazard and encourage natural reproduction.

As the work in the field expanded, it became necessary to add to the clerical staff. Tree planting, inspections, distribution of trees, fire protection, and forest surveys were now being expanded annually. To these functions were added timber sales and collection of dues on the forest reserves, dealing with squatters (a never-ending source of irritation to the authorities at that time); the administration of timber lands outside the forest reserves; and the supervision of grazing, forest tree planting, and irrigation.

The reserves in the foothills provided pit props for the coal mines and at the same time became popular as grazing sites. It was estimated that by 1920, nearly 100 000 head of livestock — cattle, horses, sheep belonging to ranchers and settlers — were grazing in the national forests, as they were then called. They also became popular as holiday resorts.

When the branch assumed responsibility for irrigation in 1907, it became involved in additional administrative activity. The construction of irrigation systems in southern Alberta and Saskatchewan was being completed under the direction of an irrigation commission that reported annually to the superintendent of forestry. The work had particular urgency as the animal population in these valuable ranching areas was increasing rapidly and the need to provide an increased supply of winter feed was acute. The plan was to reduce the size of individual ranches and lay out the irrigation systems so that larger herds could be maintained on smaller ranches. Irrigation was also used effectively in Alberta to expand the beet industry, and it became a major factor in western development.

In 1908 another important development took place within the Forestry Branch when the Forest Economics Section was formed. The original work of gathering statistical data concerning the forest and forest industries of Canada was undertaken at that time by A.H.D. Ross, a graduate of the University of Toronto and the Yale School of Forestry, who in 1907 had been in charge of the timber survey on the Riding Mountain Forest Reserve. He resigned from the branch that fall to accept an appointment as a lecturer in forestry at the University of Toronto and, while on the university staff, undertook his work on forest statistics under the direction of the Forestry Branch.

The result of Ross's work was published in the fourth Forestry Branch Bulletin issued in 1909 and was the first publication of such material in Canada. The bulletin contained statistical information on the export and import of forestry products since Confederation, and information on the production and the size of forest areas in Canada. There were also sections on production and trade for the provinces of British Columbia, Ontario, Quebec, New Brunswick, Nova Scotia, and Prince Edward Island.

H.R. MacMillan, who had recently been appointed to the permanent staff of the branch after his graduation from the Yale School of Forestry, continued Ross's work and the branch gathered and published such information annually until 1917, when the Dominion Bureau of Statistics took over the publishing in its yearly census of industry. However, the branch continued to work in the field of forest economics and collaborated with the bureau in that part of its work, making any subsequent forest information issued by the bureau a joint project of the two organizations.

Meanwhile, the first Faculty of Forestry had been established at the University of Toronto in 1907, and Dr. B.E. Fernow was dean of forestry. He had been chief forester of the United States from 1886 to 1889 and had established the first forestry school in America at Cornell. Fernow remained dean at Toronto for 12 years. In 1908 a forestry school was established at the University of New Brunswick, and graduates from this school, as well as from Toronto, played an important role in the future of Canadian forestry.

Another important development was the formation of the Canadian Society of Forest Engineers in 1908. Again, members of the Forestry Branch were deeply involved. The first recorded meeting preceding its formation took place on March 12, 1908, and included Abraham Knetchel, inspector of forest resources in the branch, and F.W.H. Jacombe, forestry branch technical assistant. The meeting took place in a committee room of the Montreal Board of Trade, and Dr. Fernow was chairman of the organizing group. Elwood Wilson, forester of the Laurentide Company, and G.C. Piché, forester of the province of Quebec, were the other organizing members. Jacombe was assigned the formidable task of drawing up the constitution and selecting a name for the new society that same night. The following day, the founding meeting took place. Dr. Fernow was elected president; R.H. Campbell, vice president; F.W.H. Jacombe, secretary–treasurer; and R.R. Bradley and G.C. Piché, members of the executive committee. Two of the five-man executive were from the Forestry Branch, and one was its superintendent.

The objectives of the Canadian Society of Forest Engineers, which later changed its name to the Canadian Institute of Forestry, were threefold: to advance its members in the theory and practice of forestry by the discussion of technical subjects; to promote a better mutual acquaintance and understanding among Canadian foresters; to promote the practice of forestry in Canada and the interests of the profession as a whole.

The Forestry Branch's responsibilities continued to grow. In 1908 the Dominion parks, including Yoho National Park, Glacier National Park, Jasper National Park, Elk Island National Park, and Buffalo National Park were transferred to the branch. They were to be administered by a commissioner of Dominion parks, and a superintendent for each park

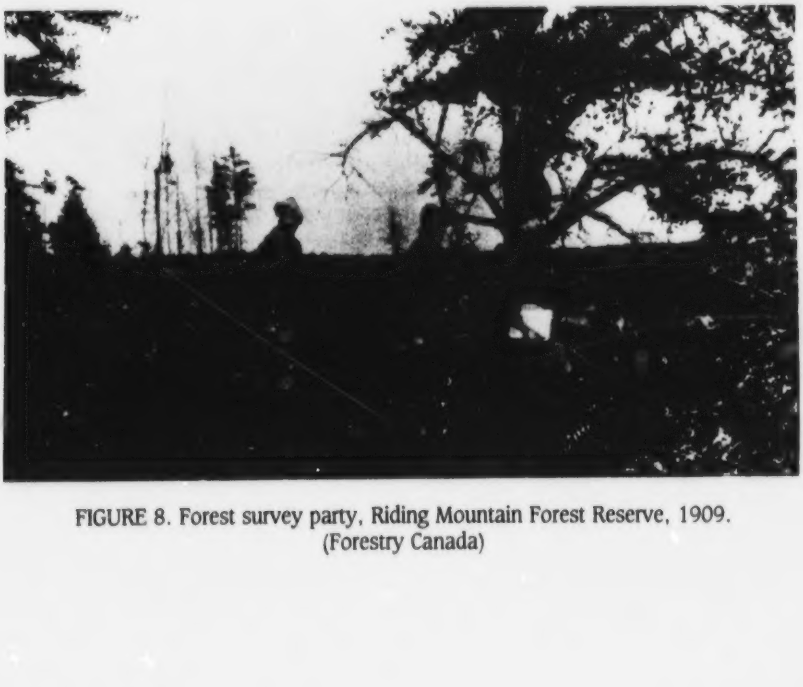


FIGURE 8. Forest survey party, Riding Mountain Forest Reserve, 1909. (Forestry Canada)

was appointed. That year some 400 buffalo were transferred to Elk National Park from Manitoba, and Buffalo National Park was created to accommodate the intended increase. A wire fence 2.7 m (9 ft) high and 119 km (74 miles) long was built around Buffalo National Park.

The same year a new set of timber regulations was passed by order-in-council, providing for the selling of timber berths by public auction at the various offices of the timber agents. Surveys were to be conducted by competent cruisers before each sale. The quantity and value of the timber would be declared on oath by the cruiser, and an upset, or bottom, price declared by the minister of the Interior. This allowed the public the opportunity to bid for a particular berth in free and open competition.

While these developments were taking place on the federal scene, parallel activities in the provinces added impetus to the growing public interest in forestry. In the province of Ontario, the Department of Lands, Forests and Mines was created in 1905. The Ontario Forestry Branch was set up within this department and, almost from the start, developed a program of reforestation in the woodlots of southern Ontario.

In Quebec in 1909, two young French Canadian graduates of the Yale Forestry School, G.C. Piché and Avila Bédard, organized the Quebec Forest Service. Immediately afterwards the Laval Forestry School was established as a faculty at Laval University at Quebec. From this school came the graduates to carry out an active program of the service. This consisted of forest exploration surveys (the classification of soils to forestall "bogus settlement"), control of cutting on Crown lands to encourage forest renewal, the creation and management of township forests to assist farmers, and the application of conservation principles on the provincial scene.

A forest service was organized in British Columbia in 1912 under the forest act of that year. It was headed by a chief forester, who was in charge of all forest conservation, protection, and utilization activities.

New Brunswick followed the next year with the appointment of a chief fire warden, responsible for enforcing the Forest Fire Act, which had been on the statutes of New Brunswick since 1885. The Forest Service was established in New Brunswick in 1918. Other provinces set up their own forest services at later dates, but these were the key provinces in terms of forestry wealth.

By 1909 the Forestry Branch had a permanent staff of 40 and an appropriation of $100 000. The program for the coming year was ambitious. Six survey parties were to be in the field, each to consist of a forester-in-charge, three assistant foresters, and a cook. Of these parties, two would be in the railway belt in British Columbia, two on the eastern slope of the Rockies, and two on the Hudson Bay Railway route. Until then nearly 607 000 ha (1.5 million acres) of the 4 million ha (10 million acres) of the forest reserves and parks had been surveyed. The superintendent urged exploratory surveys by the Forestry Branch across the entire northern forested area that extended more than 1600 km (1000 miles) from Hudson Bay westward to the Rocky Mountains, and was more than 640 km (400 miles) deep. He estimated that the project would cost $200 000 and would take 10 years to complete. Forestry in Canada was progressing rapidly.

# 7. Conservation and Other Trends

Probably the most significant event of 1909 was the formation of the Commission of Conservation. This, in turn, could be traced back to the 1906 Canadian Forestry Convention and Laurier's concluding admonition: ". . . our labours are just commencing. . . ." In 1909 Canada accepted an American invitation to attend the North American Conservation Conference in Washington, D.C. When the delegates to that conference drew up a Declaration of Principles based on the thesis that "all resources were to be developed, used and conserved for the future, in the interest of mankind," the Canadian delegation firmly supported the thesis. The closing portion of the declaration called for the formation of a Commission of Conservation in each of the participating countries. Again, Canada responded promptly. The Act to Establish a Commission for the Conservation of Natural Resources was assented to on May 19, 1909.

The commission consisted of 20 members. *Ex officio* members included the minister of Agriculture, the minister of the Interior, and the minister of Mines, as well as the appropriate provincial ministers in charge of the administration of natural resources in each province. Of the members appointed by the governor-in-council, at least one appointed from each province was to be a member of the faculty of a university within the province, "if there be such university."

The act formulated the task of the commission:

> "It shall be the duty of the Commission to take into consideration all questions which may be brought to its notice relating to the conservation and better utilization of the natural resources of Canada, to make such inventories, collect and disseminate such information, conduct such investigations inside and outside of Canada, and frame such recommendations as seem conducing to the accomplishment of that end."

First chairman of the commission was Sir Clifford Sifton, who, as minister of the Interior, had fathered the Forestry Branch. Now, presumably retired from active politics but still having much of the drive that had made him a potent political force, Sifton gave the commission dynamic leadership. At its first annual meeting in 1910, he stated clearly that he understood conservation to be not simply a matter of preservation.

The commission developed rapidly as a major research institution. There was representation from the federal and provincial governments, as well as from the universities whose primary concern was to expand the knowledge about natural resource management and planning and to make this knowledge readily available to practitioners. It also acted as a coordinating agency and a clearinghouse for research studies being undertaken across Canada. Internally, the commission was organized into six committees: forestry, lands, fish and wildlife, water, minerals and fuels, and public health. In each of these fields a veritable flood of papers and reports was prepared and published.

In 1909 and 1910 the first inventory of an entire province was taken in Nova Scotia for the commission by Dr. C.D. Howe and J.H. White of the Faculty of Forestry of the University of Toronto, under the direction of Dr. B.E. Fernow. The report was published by the commission in 1912. From 1914 to 1916, the commission conducted an inventory of the forests of British Columbia at the request of the provincial government.

Professor T.W. Dwight joined the federal forestry service in 1911, on graduation from the University of Toronto School of Forestry and with an M.Sc. from Yale. He had spent his student summer of 1910 with Howe and White on the commission's Nova Scotia survey. He recalled the demise of the commission. As he remembered the circumstances, the commission "got into hot water" when it republished some studies done by the waterpower board of the Department of the Interior. Senator James Alexander Lougheed, who was waterpower chairman, considered the republishing of the studies a waste of money. After investigating the Commission of Conservation, he decided that the commission was doing little constructive work. By this time the redoubtable Sifton had retired from the chairmanship of the board. Campbell, a good friend of the board, in November 1918 had suffered the accident that would cause his retirement. Even the Forestry Branch was alienated when, after Meighen turned down its request to have Dr. Howe conduct a study at Riding Mountain, the commission promptly funded Howe's study. When the commission was attacked, it had few friends left to defend it.

Meanwhile, the Forestry Branch was growing. On May 19, 1911, the year that Campbell's official title was changed from superintendent to director of forestry, a new Dominion Forest Reserves and Parks Act was passed. It was an enlarged version of the 1906 Dominion Forest Reserves Act but included an important new stipulation that gave the government power to purchase and expropriate land within a reserve that was not Crown property. Previously, exchange was the only means of effecting this transfer. The new act also provided that railway companies should be liable for half the cost of fire patrols along their lines under construction and that rangers on duty during such patrols should be carried free. The rangers were given the authority to arrest offenders and bring them before a magistrate or remove them from the reserves. They could also seize timber, minerals, or game unlawfully taken from the reserve, and could confiscate firearms, fishing tackle, or other gear used unlawfully. The area of the forest reserves was increased to 61 499 km$^2$ (23 745 square miles), the most notable addition being the eastern slope of the Rocky Mountains, called the Rocky Mountains Forest Reserve.

In the same year, the branch produced 16 publications covering a variety of subjects from farmers' plantations to forest statistics. The demand for literature about forestry was growing. Some 30 000 fire notices were distributed and posted throughout the fire rangers' districts. Two hundred thousand copies of a small pamphlet explaining the dangers of forest fire, the chief provisions of the fires act, and the best methods of fighting forest fire were distributed throughout western Canada in English, French, Ruthenian, German, Norwegian, Hungarian, Swedish, and Russian.

By 1912 there were 127 fire rangers patrolling the vast area between Hudson Bay and the Rockies. This land lay outside the reserves and Campbell pointed out that a chief weakness of fire ranging there had been the lack of proper inspection to determine what districts should be patrolled and how the patrols should be organized. On the reserves, the branch worked to organize a system of fire protection and management by building up a good permanent staff, a system of roads, forest ranger stations, trails, bridges, and telephone lines. A standard of special qualification was established for the selection of rangers.

During 1911 there were 438 forest fires in the western provinces, most of them caused by railways, hunters, and travellers. The worst single fire was estimated to have destroyed about 118 000 m$^3$ (50 million board feet) of timber. After the construction of the Hudson Bay Railway, a chief ranger was posted at Norway House and another at Split Lake, in the

Keewatin District north of Lake Winnipeg. The travelling population was mostly Indians, freighters, and canoemen for the Hudson's Bay Company. To interest the Indians in fire prevention, a small fire ranger's badge and pledge, with Indian lettering, was distributed by the rangers. The pledge translated as follows:

"We Indians appreciate the work the government is doing to prevent forest fires in our district. We pledge ourselves to do all we can to help. We promise to put out our own camp fires every time before leaving camp. We accept the badges given by the government as a pledge."

Chief Fire Ranger A. McLean reported on the reception of the pledges by the Indians:

"With few exceptions the Indians have all been very careful this summer. Not a single report of fire has been received by me. We had no trouble getting the Indians to sign the enclosed pledges. Before I would let them sign I made sure they thoroughly understood the nature of their pledge. One and all they were much pleased with the badges given them.

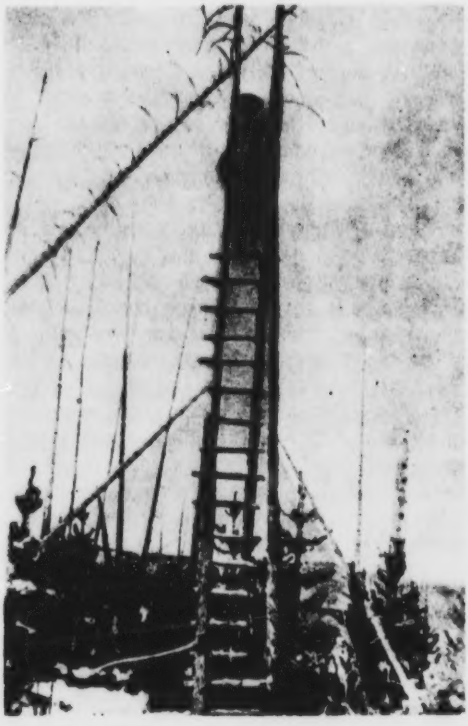


FIGURE 9. Forest lookout station, the Brazeau Forest, Alberta, 1913. (Forestry Canada)

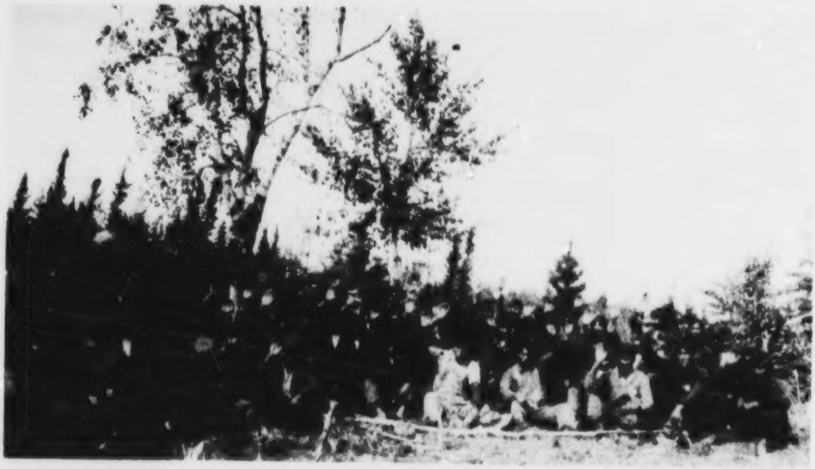


FIGURE 10. Indians promising Inspector Herchmer (*extreme left*) to extinguish their campfires and assist rangers, Island Lake, Manitoba, 1917. Several are wearing the fire ranger badge. (Forestry Canada)

They pinned them in all sorts of places on their clothing, where each one's fancy thought the most conspicuous place. One man would not take his badge until he had first washed himself and changed his shirt, and then the badge was used as a collar button or brooch. Hats and shirts were the favorite spots for adornment but not a few — after carefully polishing them — would fold them in cloth to keep them for some special occasion. A great percentage of them feel they are thus, having received the badge from the government, constituted minor chiefs and guardians of the forest."

A new system was adopted in 1912 to deal with the administration and production of timber lands coming under the branch's control. The western provinces were divided into four inspection districts, with a district forest inspector in charge of each district. Offices were opened at Winnipeg, Prince Albert, Calgary, and Kamloops. District inspectors had charge of all the work in their particular province, and under each inspector was a staff of foresters and forest supervisors who had charge of the individual reserves and forest districts. All general plans were submitted to head office for consideration and all work was coordinated and controlled from Ottawa. This entailed keeping a detailed record of such work for the information of Parliament. At the same time, prairie tree planting had so expanded that a second nursery had to be established. The staff then included 32 at head office, 5 inspectors, 12 forest supervisors, 4 forest assistants, 46 forest rangers, 8 inspectors of tree plantations, and 9 clerks in the field — a small number considering the work accomplished.

It was during this stage of development that the collection of statistics on forest production and consumption was reorganized under the supervision of a technical forester. Statistics on production included lumber, lath and shingles, pulpwood, poles and crossties, and tight and slack cooperage. Annual bulletins were issued covering these main classes. Gathering statistics at that time meant corresponding with some 3000 firms across Canada. In addition to head office staff, who looked after the correspondence, it was necessary to have a field organization of men familiar with local conditions, who gathered statistical information through personal contact with firms and associations throughout their respective districts.

In 1912 the first graduates of the new schools of forestry at the University of Toronto and the University of New Brunswick appeared, and the branch added to its permanent staff T.W. Dwight, D. Roy (Sandy) Cameron, S.S. Sadler, and E.G. McDougall from Toronto, as well as H.C. Kinghorn from New Brunswick.

During this period it was decided that the Forestry Branch should cooperate with the North West Mounted Police in the protection of the last of the roaming herds of wood bison, located near the Slave River. Two men, George Mulloy, then an undergraduate of the Ontario Agricultural College, and Peter McCallum, an experienced trapper, were appointed to locate the herds and determine the cause of their destruction. It was assumed that wolves were preying on the wood bison and the men were charged with eliminating the wolves.

Mulloy's reports over the following 2 years make fascinating reading. On their first trip, in 1911, they left Fort Smith, Northwest Territories, in June with two packhorses and an Indian guide, heading northward for the Salt Lake Indian settlement. After travelling west and north from there, crossing rivers in small boats with their horses swimming alongside them, through deserted Indian villages, over mountains and down through swamps and muskeg and tangles of undergrowth, following old Indian trails when possible and making new ones when necessary, finally, after 10 days, they encountered the first signs of buffalo. Mulloy's diary for Sunday, June 18, 1911, recorded:

> "At last there is a change in the character of the country. Big reaches of jack pine of fair size, fifteen to twenty inches in diameter, and numerous stretches of straight poplar of the same size are encountered everywhere. . . . Then the buffalo signs begin to appear on every hand. Immense wallows surround us. The ground and trails are pitted with them. Fresh tracks are seen in many of the wallows and soft places, and many of the tree trunks near the trail are used by the buffaloes as scrubbing posts. On these much hair was hanging. . . . This trail had evidently been used very long and also very recently. One could easily see that it was made by some wild animal because where the grass was poor it was straight and narrow and where the feeding was better it was very scattered and indistinct. Here we saw the first and only bison seen on the trip. An old bull was standing in a big wallow fighting flies, and although we used no particular caution in approaching him, he did not seem to notice us. We were able to get within thirty or forty feet of him. We watched him for some time and then he turned his head and saw us. He made off at a surprisingly fast pace considering his size and the lumbering way in which he travelled. He had probably been driven away from the herd by the younger bulls. He was not fat, although rich feed was on every hand."

The buffalo patrol continued for 2 years, investigating conditions affecting the wood buffalo in the Slave River district. The area patrolled extended north from the Peace River to Great Slave Lake and from the Slave River west to the Caribou Mountains. The investigations revealed that the buffalo were not concentrated in large herds but were scattered in small bands or alone throughout the country from the Peace River to Great Slave Lake. At the end of the 2 years Mulloy estimated the number of buffalo to be over 500. Contrary to expectations, the timber wolves did not seem to have taken a heavy toll. Mulloy believed no definite conclusion could be drawn concerning the reason for the disappearance of the buffalo. Nevertheless, he recommended offering a large bounty for wolf pelts, apparently to discourage the wolves from any incipient bad habits. The undergraduate Mulloy would later develop into a stalwart of the federal forestry service.

Undoubtedly the principal development that took place before World War I — and it would prove an important favorable factor when the future of the service rested in the balance 17 years later — was the establishment of the Forest Products Laboratories of Canada in 1913. Developed under the jurisdiction of the Forestry Branch and in cooperation

FIGURE 11. Forest Products Laboratories of Canada, Montreal, Que. (Forestry Canada)

with McGill University in Montreal, which provided a site on its campus and some of the buildings required for their accommodation, the laboratories had five main targets:

(1) to secure authoritative information on the characteristic mechanical and physical properties of commercial woods and on products obtained from them;

(2) to study and develop the fundamental principles underlying the preservative treatment of wood and the use of wood in the production of fiber products;

(3) to develop practical ways and means of using wood that under existing conditions was being wasted;

(4) to serve as a public bureau of information on the properties and utilization of forest products;

(5) to cooperate with consumers of forest products in improving existing methods of use.

The establishment of the Forest Products Laboratories of Canada represented a break from the purely administrative role for the Dominion forests that the Forestry Branch had been playing in the eastern provinces. It was an entirely new field and portended the wider horizons of the future.

The first superintendent of the laboratories was A.G. McIntyre, a Nova Scotian, who had graduated in arts from Acadia University and in chemical engineering from McGill. He was editor of the *Canadian Pulp and Paper Magazine* and had also organized the Canadian Pulp and Paper Association, of which he was secretary. McIntyre's first step as superintendent was to tour the Forest Products Laboratory of the United States Forest Service at Madison, Wisconsin, to study the methods followed there and the investigations being carried out. As a result of that visit it was decided that the Canadian laboratories would not duplicate the work done by the American laboratory but would follow its general methods and keep the same system of records for comparison purposes.

Of the seven later divisions in the work of the Forest Products Laboratories of Canada, three were immediately established: those dealing with timber physics, timber tests, and pulp and paper. A wood preservation division was organized in 1915. Through the courtesy of McGill University, two small buildings on University Avenue were placed at the disposal of the laboratories; later an adjoining building was reconstructed to serve as a pilot paper mill.

While World War I loomed, another activity was beginning that 50 years later would have a major impact on the role and history of the federal forestry service.

# 8. The Beginnings of Forest Entomology and Plant Pathology

It was inevitable that the science of entomology and its twin, plant pathology, should have the federal Department of Agriculture as their sponsor, because it was in the cultivated field crops of the farmers that insects and plant disease found their most sensitive area of operation. Disease and insects in the natural forest, which cost nothing to produce and which seemed limitless, did not hit the country's pocketbook like wheat rust or the Colorado beetle in the potato crop. The challenge that they offered, in turn, produced a response in several remarkable men, who established the basis for these sciences as they exist today.

Entomology, the parent of forest entomology and of plant pathology, began in Canada about the middle of the last century with a small group of gifted hobbyists. A hundred years later there were more than 400 professional entomologists, more than 50 research centers, 16 teaching centers, and 8 professional societies. The driving force behind this growth was the economic necessity created by the insects themselves. Entomoiogy developed as an applied science, and Canada's Department of Agriculture played a leading role. In the critical formative years the names of men like Bethune, Saunders, Fletcher, Lochhead, and Hewitt emerged as those of outstanding leaders.

On September 16, 1862, the Rev. C.J.S. Bethune, an Anglican clergyman who would become head of the Department of Entomology and Zoology at then Ontario Agricultural College, and William Saunders, a druggist, who would become the first director of the Dominion Experimental Farm Branch, organized the first meeting of entomologists to take place in Canada. It was held at the home of Professor Henry H. Croft of the University of Toronto, and 10 people met there to form an entomological society and formulate its objectives. The Entomological Society of Canada was formally established the following year with Croft as president, Saunders as secretary-treasurer, and a membership of 25.

The insect pest problem continued to worsen, and soon the society became deeply involved in articles and reports providing information both for the governments and for individual farmers. In 1883 Saunders published a remarkable book, *Insects Injurious to Fruits*, which became the principal North American reference in that field for several decades.

The same year, James Fletcher was appointed honorary entomologist to the Dominion Department of Agriculture. He was the accountant in the Library of Parliament and it was there the parliamentary librarian, Dr. Alpheus Todd, encouraged him to develop his knowledge as a naturalist. In March 1879 he founded the Ottawa Field Naturalists' Club with a few kindred spirits. That year he published his "Flora Ottawaensis" in the club's *Transactions*, and "Additions" in later years. He maintained an active correspondence with other naturalists in both Canada and the United States.

Fletcher was still on the staff of the Library of Parliament in 1884 when he was appointed entomologist in the Dominion Department of Agriculture; in 1886, when the Experimental Farm Branch was organized, he became its entomologist and botanist and held these two positions until his death in 1908. Although he never had more than two assistants, he maintained an active correspondence with farmers throughout the country and he had 400 regular observers who provided an effective insect-reporting service. He was responsible for the San José Scale Act of 1898, the first federal legislation on noxious insects.

Meanwhile, other important developments were taking place. Instruction leading to special training in entomology was begun at the Ontario Agricultural College in 1877 under Peter H. Bryce. At Macdonald College in 1907, Professor William Lochhead, assisted by J.M. Swaine, started an entomology course; in 1908 a course in forest entomology was added at the University of Toronto and E.M. Walker was in charge. Lectures in entomology began at the School of Agriculture, Truro, Nova Scotia, in 1888, and at the Manitoba Agricultural College in 1906. The scientific achievements of such entomological leaders as Saunders, Bethune, Abbé Provancher, Fletcher, and the Rev. G.W. Taylor of British Columbia led to their election as fellows of the Royal Society of Canada. In 1909 entomology and botany were made two separate divisions at the Experimental Farm Branch and Dr. Charles Gordon Hewitt, a well-trained British scientist, was appointed to succeed Fletcher as Dominion entomologist.

Hewitt provided strong leadership from the start. At his urging, the important Destructive Insect and Pest Act was passed in 1910. The act, together with its regulations, still forms the legal basis for federal action against the introduction and spread of noxious insects, and the administration of the act necessitated a sharp increase in the amount of money and staff available for entomological work and for the development of field laboratories. Hewitt established small laboratories in all provinces except Prince Edward Island, and in 1912 he appointed J.M. Swaine as his assistant in charge of forest entomology, a field that had been completely neglected until then. In 1914 entomology was separated from the Experimental Farm Branch and established as a distinct Entomological Branch. This was organized into four functional divisions — Field Crop and Garden Insects (1914), Forest Insects (1914), Forest Pests Suppression (1919), and Systematic Entomology (1919).

Just as the decision to separate entomology and botany raised the status of entomology as a science, so it led to the beginning of plant pathology in the Department of Agriculture and to the appointment of Dr. H.T. Gussow as botanist in the Division of Botany in 1909. Gussow became the first chief of the Botany Division and he guided its destiny for 35 years, until 1944. One of Gussow's first official acts was to collaborate with Hewitt in securing passage of the Destructive Insect and Pest Act.

At first Gussow did considerable laboratory work himself and published many bulletins and papers as well as short popular articles. His authoritative book *Mushrooms and Toadstools* was published in 1927. But Gussow believed strongly that the effective study and control of plant diseases should take place in the areas where the problem existed, and he pushed for the opening of laboratories, which were eventually established in every province. The first one was opened in St. Catharines, Ontario, in 1912. Inevitably, administrative work left him less and less time for scientific activities.

Many in the Canadian Forestry Service in 1974 recall vividly the presence and personality of Gussow, who was active until 1944, but recollections of Fletcher, who died in 1909, and Hewitt, who died in the influenza epidemic of 1920, are chiefly of their achievements rather than of their personalities. One link with that period was provided by W.N. Keenan in November 1972. Keenan began his career in entomology as an insect pest inspector with the New Brunswick Department of Agriculture on January 1, 1914. In May 1914 he joined the newly formed Entomological Branch of the Dominion Department of Agriculture. Transferred to Ottawa in 1942, he became director of the Plant Protection Division. He retired on March 9, 1960.

Discussing the state of pest control in 1914 he remembered that the staff was limited and had few graduates but he had fond recollections of the field work in those early days:

> "When we first started out as a scout for the brown-tailed moth, looking for winter nests, it was $50 a month and, of course, expenses. . . . We put up at farm houses during the trip . . . and we took a small hotel during the weekends, where we could have a bath. . . . Out in the country, the usual charge was 25 cents for a meal and 50 cents for a bed; so the expense accounts . . . submitted monthly would contain a reference, 'supper, bed and breakfast, 75 cents.' And one fellow in his expense account had recorded: 'Supper, all night with Mrs. Jones, and breakfast, 75 cents.'"

Queried about Fletcher, he said:

> ". . . There is no doubt that Dr. Fletcher did complete a lot of activities which led eventually to the recognition of entomology in this country. . . . I would say that he was so much a naturalist . . . he had no particular interest in administrative work or the expansion of present administration to future levels. He had, I think, one male assistant in the field of entomology, and one clerk, and that was the total staff recognized in the field of entomology in the country."

About Hewitt, he said:

> ". . . Hewitt was appointed to direct the Experimental Farm in Ottawa, but he soon became known as an outstanding scientist. Shortly after his arrival, he initiated a program on the biological control of the larch sawfly. He organized the Entomology Branch into three meaningful units that still retain some of their original features. Hewitt took an active part in the first step towards the organization of the professional workers in Canada and became the first president of that organization. He became president of the American Association of Economic Entomologists in 1916. Also in 1916 he was the consulting zoologist to the Canadian government, and he was a Canadian representative on the International Commission for the Protection of Nature, and drafted the Migratory Bird Treaty, which later came into force. His book, *The Conservation of Wildlife of Canada*, was completed shortly before his death. It was published posthumously by his wife, Elizabeth. He was a victim of influenza and pneumonia, and died in February of 1920."

Entomology and plant pathology would play important individual roles in developing forestry as a multidisciplined science in Canada.

# 9. The Forestry Branch in World War I

The impact of World War I was not immediately felt by the Forestry Branch. But as the war continued, the branch was severely handicapped, even as its contribution became more and more important to the war effort. On June 14, 1915, Campbell recorded a steady advance in perfecting the organization of personnel and functions on the forest reserves and the development of improvements for protection and management. The fire patrols outside the reserves were extended considerably to protect the northern districts, and surveys were continued to obtain accurate information on timber stands and agricultural possibilities in the railway belt and in the northern forested area of the Prairie provinces. In silviculture, the chief emphasis was on the enforcement of the provision requiring disposal of harvesting slash. He predicted accurately that each year would show less difficulty in its enforcement.

Campbell recognized that the chief task of the branch was the protection and management of the forests, but he insisted that proper management required scientific knowledge. He reported that a plan for organizing scientific forest investigations and enlisting the cooperation of foresters throughout the country was under consideration and he hoped to see it organized the following year.

Organization of the new forest products laboratories was now well under way. The Division of Timber Physics and Timber Tests had been organized, and the Pulp and Paper Division was also formed in 1914. A division dealing with wood preservation was also organized to handle urgent requests for information, and a division to deal with problems of the lumber industry was being considered for the near future. Cooperation with the universities, which had begun with McGill, was now extended to Queen's.

It was not until 1916 that Campbell acknowledged the effect of the war on the branch. Conditions made it necessary to restrict developments. The work of the Forestry Branch was being affected by staff losses to the armed forces — a total of 30 had enlisted by then. The forest wealth, however, had to be protected. It would be sorely needed in the postwar period in Canada and in Europe.

In 1916 Dr. B.E. Fernow, dean of the Faculty of Forestry at the University of Toronto, visited several federal forest reserves. He brought out a report that emphasized the need for scientific research of the forest resource. Campbell quoted the report in support of his own views and those of the advisory committee formed the previous year. It had made specific suggestions regarding certain lines of investigation that required immediate attention, "but the scarcity of men resulting from the war and the necessity for economy from the same cause have made it impossible to undertake any special organization for such work."

The work of the forest products laboratories, which had been organized quickly and efficiently, was plagued through the war by enlistments, by the diversion of activities to munitions work, and, more seriously as the team developed, by wholesale raiding from the industries, which the laboratories had been organized to assist.

There was, however, one significant piece of good news. At the request of the Imperial Munitions Board, a laboratory was established in Vancouver to test airplane timbers, particularly Sitka spruce. L.L. Brown, who had been in the Montreal laboratories and who had just returned from overseas service, was placed in charge. The laboratory was located on the grounds of the University of British Columbia. Later it would grow into the Vancouver Forest Products Laboratory, rivalling its parent in size and importance.

FIGURE 12. Visit to Red Deer ranger station, Alberta, 1916.
*Sitting*: Director R.H. Campbell and Mrs. B.E. Fernow.
*Standing*: ranger Walter Potts and Dr. B.E. Fernow, dean of Forestry at the University of Toronto. (Forestry Canada)

If there was one subject that obsessed Campbell to the end of his active career as director of forestry, it was the need for scientific research. A man without any scientific training, who staffed his organization with scientifically trained people, Campbell never let his superiors forget this need. He reiterated his arguments in his annual reports, and he cited the reports of Fernow and other authorities to give them weight. In 1917 he quoted from the memorandum of the forestry advisory committee that had been prepared for the newly appointed Dominion Council for Scientific and Industrial Research, pointing out the great need for organizing forest research in Canada. The memorandum bluntly stated that ignorance, lack of definite information, and opinions rather than knowledge of facts had in the past characterized, and still largely characterized, the methods of handling the forest resources of Canada, to their detriment and loss. Governments and private owners alike treated their forests like mines rather than like crops. Such ignorance could only be eliminated by systematic investigation or research. There was only one way to keep the forest resource inexhaustible, and that was reproduction. Next to nothing was known about whether cutover lands were reproducing timber that had been removed, or at what rate.

In silviculture the systematic study of the biology of tree species had not yet begun. This could only be done by field observation and by the establishment of permanent sample plots placed under different conditions and observed periodically. Knowledge was lacking of the rate of production that might be expected from species under varying conditions. There were neither volume tables for timber estimating nor growth or yield tables as bases for calculating the results of silviculture. Meanwhile, foolish ideas prevailed regarding the rate of growth of forest trees and forest acres. These ideas could only be eliminated by systematic measurement, and these investigations were most urgently needed for the species of the eastern provinces.

Campbell added that the Council for Scientific and Industrial Research believed the matter important enough to call for early consideration of a research program to be carried out in Canada. As a direct result of this consideration, the council recommended an appropriation of $6000 to begin forest research and called on the Forestry Branch to undertake the work. It was decided to begin with a forest experiment station, and the fortunate coincidence that the Department of Militia and Defense had asked for Forestry Branch help at Petawawa military camp to manage their forests made that area the logical choice for the station. Accordingly, a tract of forest land was placed at the disposal of the Forestry Branch, and a forest survey was begun to determine its nature and condition. Campbell noted with satisfaction that the tract was in the pine district of Ontario, had been included in timber berths and cut over for pine, and was thus an ideal location to study the development of this important species.

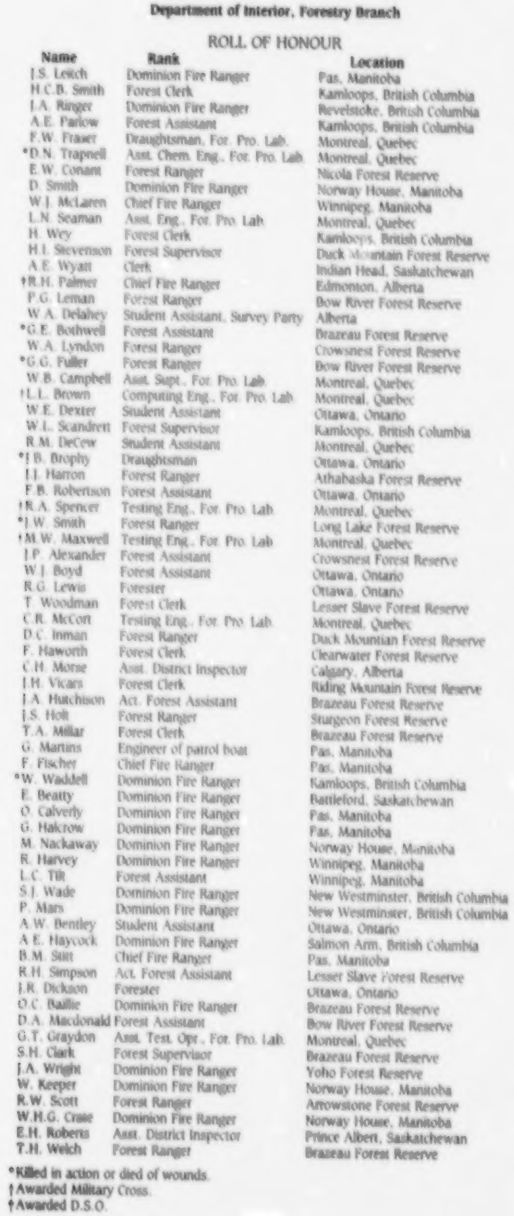
Another notable event was the discovery of white pine blister rust in Canada, a fungus disease that seriously threatened the growing of white pine in this country. It had been first observed in Canada in 1914, and studies had been made of its life history and spread in Canada. Of the same family as rust in wheat, it had many similarities, including the characteristic of having two host plants. In this case currant bushes, particularly black currant, were the hosts in the first stage of development of the fungus, and the white pine was a second host. As a result of investigations undertaken by the Bureau of Plant Pathology of the Department of Agriculture and also by the provinces of Ontario and Quebec, it was found that the disease was widespread through southern Ontario and had appeared in Quebec.

Two successive international conferences took place in the United States in 1917 and 1918 to consider this threat to the white pine, and proposals were made to control the distribution of currant and white pine stock to localize the disease as much as possible to the eastern United States, where it was most prevalent. It was felt that eradication of the disease was now impossible.

In Canada the problem was considered by representatives of the Department of Agriculture and the Department of the Interior, the Commission of Conservation, the provincial governments, and the Canadian Lumbermen's Association. It was decided to recommend to the Dominion government that a committee representing the various interests involved be appointed to investigate the whole question and that a special appropriation of $25 000 be provided to finance the work. The subsequent committee, which included all the interests mentioned plus the Canadian Nurserymen's Association, proposed a series of recommendations covering the shipping of white pine, currants, and gooseberries into the areas and provinces most threatened.

It was decided that the investigation of the history of the disease, which was being carried on by the Bureau of Plant Pathology, be continued, and that sample areas be selected in the provinces of Ontario and Quebec, at several different places, to study further

FIGURE 13. Forestry Branch employees enlisted for active service until close of 1917. (Forestry Canada)



**Department of Interior, Forestry Branch**

ROLL OF HONOUR

| Name | Rank | Location |
|---|---|---|
| J.S. Leitch | Dominion Fire Ranger | Pas, Manitoba |
| H.C.B. Smith | Forest Clerk | Kamloops, British Columbia |
| J.A. Ringer | Dominion Fire Ranger | Revelstoke, British Columbia |
| A.E. Parlow | Forest Assistant | Kamloops, British Columbia |
| F.W. Fraser | Draughtsman, For. Pro. Lab. | Montreal, Quebec |
| *D.N. Trapnell | Asst. Chem. Eng., For. Pro. Lab | Montreal, Quebec |
| E.W. Conant | Forest Ranger | Nicola Forest Reserve |
| D. Smith | Dominion Fire Ranger | Norway House, Manitoba |
| W.J. McLaren | Chief Fire Ranger | Winnipeg, Manitoba |
| L.N. Seaman | Asst. Eng., For. Pro. Lab. | Montreal, Quebec |
| H. Wey | Forest Clerk | Kamloops, British Columbia |
| H.I. Stevenson | Forest Supervisor | Duck Mountain Forest Reserve |
| A.E. Wyatt | Clerk | Indian Head, Saskatchewan |
| †R.H. Palmer | Chief Fire Ranger | Edmonton, Alberta |
| P.G. Leman | Forest Ranger | Bow River Forest Reserve |
| W.A. Delahey | Student Assistant, Survey Party | Alberta |
| *G.E. Bothwell | Forest Assistant | Brazeau Forest Reserve |
| W.A. Lyndon | Forest Ranger | Crowsnest Forest Reserve |
| *G.G. Fuller | Forest Ranger | Bow River Forest Reserve |
| W.B. Campbell | Asst. Supt., For. Pro. Lab. | Montreal, Quebec |
| †L.L. Brown | Computing Eng., For. Pro. Lab | Montreal, Quebec |
| W.E. Dexter | Student Assistant | Ottawa, Ontario |
| W.L. Scandrett | Forest Supervisor | Kamloops, British Columbia |
| R.M. DeCew | Student Assistant | Montreal, Quebec |
| *J.B. Brophy | Draughtsman | Ottawa, Ontario |
| J.J. Harron | Forest Ranger | Athabaska Forest Reserve |
| F.B. Robertson | Forest Assistant | Ottawa, Ontario |
| †R.A. Spencer | Testing Eng., For. Pro. Lab. | Montreal, Quebec |
| *J.W. Smith | Forest Ranger | Long Lake Forest Reserve |
| †M.W. Maxwell | Testing Eng., For. Pro. Lab | Montreal, Quebec |
| J.P. Alexander | Forest Assistant | Crowsnest Forest Reserve |
| W.J. Boyd | Forest Assistant | Ottawa, Ontario |
| R.G. Lewis | Forester | Ottawa, Ontario |
| T. Woodman | Forest Clerk | Lesser Slave Forest Reserve |
| C.R. McCort | Testing Eng., For. Pro. Lab. | Montreal, Quebec |
| D.C. Inman | Forest Ranger | Duck Mountian Forest Reserve |
| F. Haworth | Forest Clerk | Clearwater Forest Reserve |
| C.H. Morse | Asst. District Inspector | Calgary, Alberta |
| J.H. Vicars | Forest Clerk | Riding Mountain Forest Reserve |
| J.A. Hutchison | Act. Forest Assistant | Brazeau Forest Reserve |
| J.S. Holt | Forest Ranger | Sturgeon Forest Reserve |
| T.A. Millar | Forest Clerk | Brazeau Forest Reserve |
| G. Martins | Engineer of patrol boat | Pas, Manitoba |
| F. Fischer | Chief Fire Ranger | Pas, Manitoba |
| *W. Waddell | Dominion Fire Ranger | Kamloops, British Columbia |
| E. Beatty | Dominion Fire Ranger | Battleford, Saskatchewan |
| O. Calverly | Dominion Fire Ranger | Pas, Manitoba |
| G. Hakrow | Dominion Fire Ranger | Pas, Manitoba |
| M. Nackaway | Dominion Fire Ranger | Norway House, Manitoba |
| R. Harvey | Dominion Fire Ranger | Winnipeg, Manitoba |
| L.C. Tilt | Forest Assistant | Winnipeg, Manitoba |
| S.J. Wade | Dominion Fire Ranger | New Westminster, British Columbia |
| P. Mars | Dominion Fire Ranger | New Westminster, British Columbia |
| A.W. Bentley | Student Assistant | Ottawa, Ontario |
| A.E. Haycock | Dominion Fire Ranger | Salmon Arm, British Columbia |
| B.M. Stitt | Chief Fire Ranger | Pas, Manitoba |
| R.H. Simpson | Act. Forest Assistant | Lesser Slave Forest Reserve |
| J.R. Dickson | Forester | Ottawa, Ontario |
| O.C. Baillie | Dominion Fire Ranger | Brazeau Forest Reserve |
| D.A. Macdonald | Forest Assistant | Bow River Forest Reserve |
| G.T. Graydon | Asst. Test. Opr., For. Pro. Lab. | Montreal, Quebec |
| S.H. Clark | Forest Supervisor | Brazeau Forest Reserve |
| J.A. Wright | Dominion Fire Ranger | Yoho Forest Reserve |
| W. Keeper | Dominion Fire Ranger | Norway House, Manitoba |
| R.W. Scott | Forest Ranger | Arrowstone Forest Reserve |
| W.H.G. Crate | Dominion Fire Ranger | Norway House, Manitoba |
| E.H. Roberts | Asst. District Inspector | Prince Albert, Saskatchewan |
| T.H. Welch | Forest Ranger | Brazeau Forest Reserve |

*Killed in action or died of wounds.
†Awarded Military Cross.
†Awarded D.S.O.

the action of the disease. It was also decided to launch a search for the disease in the western provinces, particularly at points from where it was known that shipments of currants had been made in recent years, and to make similar searches in the as yet unaffected areas of the eastern provinces. The work was to be performed by the Bureau of Plant Pathology under the general supervision of the committee.

This marked the first recorded instance of cooperation between the Forestry Branch and the newly formed plant pathology section of the Department of Agriculture. Nearly 50 years of such cooperation would follow before the two services concerned with the forests would be united.

The branch survived World War I in excellent shape, despite the loss of staff to the armed forces and industry, and despite budget restrictions that put a general restraint on expansion. The forest products laboratories had proved themselves in the face of constant loss of key personnel, and another laboratory was being opened on the West Coast, where Canada's greatest forest wealth existed. Petawawa would open a whole new field of scientific investigation; and the beginnings of a science of forest entomology and forest pathology had been started, albeit in another department. Forestry was coming of age.

A revealing look at this period in the history of the federal forestry service has been provided by the recollections of retired members. Professor T.W. (Ted) Dwight reminisced about the Petawawa Forest Experiment Station:

"The original idea of establishing an experimental station at Petawawa, which was the first one established, was entirely to the credit of a major on the permanent staff of the Militia Department, as it was then called. He came to Mr. Clyde Leavitt, who was the forester for the Commission of Conservation, and said that they were cutting large amounts of jack pine for fuelwood at the Petawawa camp during the war, and that it was too bad that they didn't take advantage of the opportunity of doing some experimental work. There was an understanding with the Commission of Conservation that any investigation work requiring a permanent organization should be carried on by the Dominion Forestry Branch and not by the Commission, and Mr. Leavitt came to the Forestry Branch with this suggestion, and as a result the work at Petawawa . . . was undertaken."

D. Roy Cameron, who became Dominion forester in 1936, served with the Forestry Branch in Manitoba, Alberta, and British Columbia during the field seasons 1906–1910, and entered the service permanently in May 1912, as district forest inspector for the railway belt of British Columbia. Cameron was asked whether political pressures were encountered in his work:

"The answer is yes. . . . This is something quite normal and to be expected in a democracy. I can give you an example from my own undertaking. One of the first improvement jobs that was undertaken on the forest reserves in the Railway Belt was the construction of a ranger station house in the Long Lake Forest Reserve south of Kamloops. The question of the appointment of a carpenter came up and I consulted with my staff and secured the name of a man we thought was suitable. He was put to work. Within a few days the local political people came to my office and wanted to know under whose authority I had made this appointment. I told them my own. I was told that representations would be made to Ottawa. This was done and, in the particular case, my point of view was upheld.

But I learned my lesson. It is not right to say or think that appointments made from a political basis are always bad. Sometimes they are the best that can be obtained, because it is naturally the desire of those who make the representations that the work be done to the best advantage."

Allan O'Gorman, surveyor and mapmaker, who joined the Forestry Branch in 1914, recalled an unusual character he encountered when he first went to the Rocky Mountain Forest Reserve:

"Jimmy Miller . . . lived in an old abandoned oil driller's building west of Pincher Creek. . . . He had a band of about 80 horses which he ran on and off the reserve. He thought that anybody who came from Ottawa was a greenhorn in the first place and would probably cause trouble regarding the ranging of stock on the reserve in the second place. I had been over a lot of hard trails in the years prior to meeting Jimmy. However, I was not really prepared for the conditions I found at Jimmy's. Jimmy had an old bear hunter living with him and the hunter had killed several bears and, having skinned and dressed the carcasses, he put them up on top of a high pole, some 50 feet high, by means of pulleys and ropes. . . . That's the way they preserved the meat: the wind would dry out the meat and it was too high for the flies to reach it. . . . The only food supply we had was bear meat, bannock and tea, three times a day. . . . Oh, yes, the other item was applesauce, served in a chamber pot. You know what that is. Placed right in the middle of the table, a most unappetizing-looking dish. Jimmy would say, 'Have some more fruit.' Nobody hardly had any, except himself."

The achievements in forestry had been great. By the end of the war, protection measures were in force, silviculture cutting practices had been introduced, and fact-finding surveys were in progress. The age of scientific forestry had begun.

# 10. Reconstruction

Just when the government seemed to have accepted his arguments for the need for conservation and a scientific approach regarding forestry, Campbell suffered the accident that 4 years later was to end his career. It was in November 1918, the month of the accident, that the Rt. Hon. Sir George E. Foster, minister of Trade and Commerce, wrote:

"Canada must supervise and improve her methods of cutting and very possibly limit the yearly cut in the interests of future generations. Canada must protect her forests from fire by the wise expenditure of money in guarding and supervision. Canada must set herself diligently to the task of afforestation."

At this point, the Petawawa Forest Experiment Station's preliminary work was already well launched. The 1918 forestry report noted that during the season several sample plots had been set apart, measured, mapped, and recorded for special study. The plots were marked and mapped according to the latest methods adopted by forest research institutes and covered some of the principal types of stands, including white pine, red pine, and white birch, in various mixtures. It was predicted that "continuous and careful observation and measurements on these plots will give valuable information in regard to the growth and yield of individual trees and of stands under differing conditions of soil, soil moisture, density, light and composition." More than 50 years later, these original sample plots are still under observation at Petawawa.

The report for 1919 noted that although in all districts where technically trained foresters were located observations were being made and detailed investigations were being carried on, the organized scientific work along these lines was now centered at Petawawa and Indian Head, where many small plantations had existed for some years. Careful yearly records had been kept of the growth and development of these trees, and a store of information was being accumulated that would be of the greatest value in future planting on farms and in forests.

In 1919 the forest products laboratories in Montreal were beginning to recover from the early brain drain. Work for the year included studies of decay in pulpwood, deterioration of pulp, decay of timber in buildings, problems in manufacturing newsprint, strength tests for Nova Scotia mine timbers, factors entering into the durability of railway ties, the use of Canadian red pine for paving blocks, and the utilization of overmature aspen. The laboratories were also studying all Canadian commercial timbers to give architects, engineers, and builders complete information on their mechanical and physical properties. Douglas-fir had already been studied, and the timber investigated during 1919 was Sitka spruce, which had come into recent prominence because of its use in airplane construction.

Proof of the value of the laboratories to the business and manufacturing interests of Canada was the steadily increasing number of inquiries received relating to timber and forest products and the problems of their manufacture. The number and nature of these requests for accurate information was one of many indications of the need for broadening the scope of the work of the laboratories.

Something entirely new in the field of forest protection research was initiated in 1920. Largely as a result of the advances made in aviation during the war, the idea of using aircraft in forest fire detection became the subject of considerable speculation. Thus, in

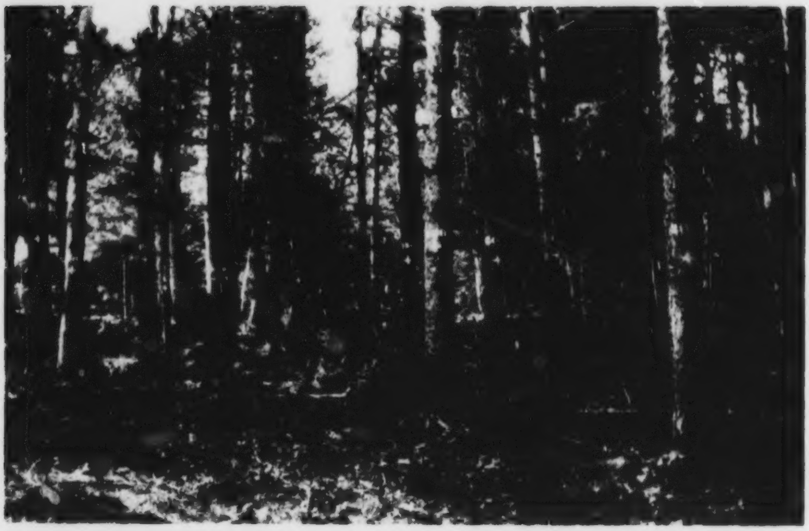


FIGURE 14. Permanent sample plot no. 1. Forty-year-old white pine, red pine, and birch. Petawawa Forest Experiment Station, Chalk River, Ontario, 1918. (Forestry Canada)

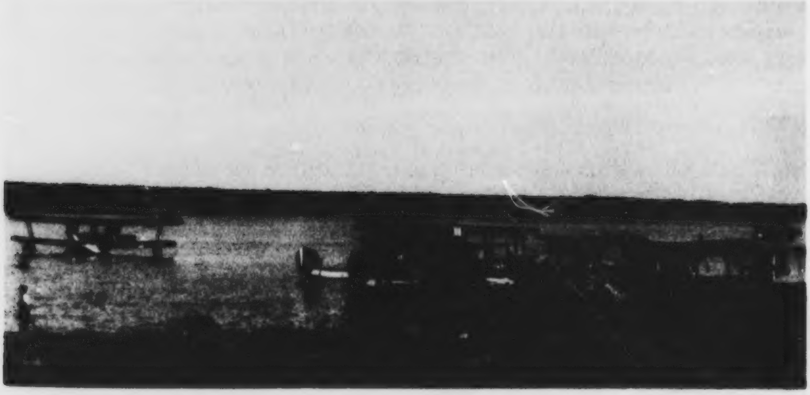


FIGURE 15. Fire patrol aircraft. (Forestry Canada)

1920 the Forestry Branch, in cooperation with the Air Board of Canada, started its first aircraft fire patrol in the West. Two patrols were established during the year, one in Alberta and the other in British Columbia. In both cases, however, it was impossible to begin the patrols until the fire hazard season was almost over. The first Alberta station was at Morley, and from there the planes made their first flights in September. The first flights from Kamloops and Sicamous, the British Columbia bases, were not made until early November. Nevertheless, several trips were made, enough to convince the forestry officers that planes offered great progress in exploration, mapping, fire patrol, and inspecting for insect infestations. Thus the branch became a world pioneer in the use of aircraft for fire protection.

In 1921 the patrols were extended to Manitoba. By 1922, the three primary fire-control functions — aircraft detection, reconnaissance, and transport of suppression crews and equipment — were defined and the value of aircraft for this work was clearly recognized. The cost was the only obstacle to large-scale development. Nevertheless, a valuable start had been made and in 1924, when it was organized, the Royal Canadian Air Force provided further flying services. At the same time, signal communications were supplied by the Royal Canadian Corps of Signals. Until 1930 a successful, though limited, arrangement of army, air force, and Forestry Branch cooperation in fire protection continued.

Other developments in protection work followed during this period, at almost regular intervals. Before the advent of radio, the telephone was the branch's chief means of long-distance communication. The single-wire, tree-line system, by which strategically situated fire towers communicated with a central ranger station, was one of many devices developed primarily for forest use. In 1920 the branch published a manual entitled *Methods of Communication Adapted to Forest Protection*. It became a standard reference work.

In 1921 three important developments were initiated in the Kamloops district by D.A. Macdonald, who had returned to the branch after the war. The first was a mountain lookout cabin, which set a new standard of efficiency and economy of construction. Then a detailed fire-control plan was developed. Finally, there was the crucially important establishment of the first seasonal forest ranger school. It had long been recognized that the forest ranger was the vital cog in the machinery of forest protection and maintenance. In European countries, there were facilities for the training of forest rangers; in Canada, there were none. Macdonald's school was long overdue.

# 11. Advances in Forest Fire Protection

The twenties ushered in a period of major advances in both the technique and the theory of forest fire protection. Equipment improved and staff was increased. The position of fire protection specialist had been created at head office in Ottawa, and D. Roy Cameron, who had been active in fire prevention work in British Columbia, was transferred there.

The Canadian Forest Fire Conference, held in 1924, brought together federal and provincial representatives on fire protection for the first time. It resulted in a full discussion of fire protection problems, and recommendations for more efficient fire control were adopted.

The most significant development in forest fire protection began in 1922, when a young civil engineer, J.G. Wright, joined the Forestry Branch. Wright was amazingly versatile. His career in forestry was, for him, a relatively minor one, and he went on to greater accomplishments. Yet, he was there long enough and worked effectively enough to be known today as the father of forest fire research.

In 1925 the Meteorological Service issued the first forest fire weather forecasts in Ontario and British Columbia. During the same year Wright, who had joined the Forestry Branch as a civil engineer, interviewed Sir Robert Frederic Stupart and Dr. John Paterson of the Meteorological Service to arrange similar forecasts for lands protected by the Dominion Forest Service. In 1926 several well-equipped weather stations were set up and operated by the service in each of its districts. Thus the valuable practice of fireweather forecasting came into being. Alberta was the first province in which this forecasting was done.

After his discussions with Dr. Paterson, Wright became interested in the relation between weather and forest inflammability. Studies in these phenomena were begun modestly at the Petawawa Forest Experiment Station in 1926. In 1929 fire-hazard studies at Petawawa were intensified. Zones of inflammability, in relation to duff, moisture content, etc., were determined for the mixed red and white pine types, and experiments with fuel-moisture indicators were conducted. The first fire-hazard notice board, for the information of visitors, was posted at the station entrance. In addition to directing this work, Wright made a preliminary study of the problem of protecting mountain lookout structures from lightning.

The influence of relative humidity in the air and the behavior of forest fires also intrigued him. Later he developed the Wright system for the measurement of forest fire danger and for forecasting fire hazard. He described his system:

"It doesn't require too much intelligence to know that a fire does not burn in the presence of excess moisture. Anybody who's tried to build a campfire with sticks of damp wood knows that it doesn't burn. The same applies to the forests that burn. The fuel must be present in sufficient quantity and continuity. It must be of a moisture content that will enable it to burn. Presence of moisture retards burning. Therefore, if you keep track of the moisture and its effect on the fuel, that is, of rainfall and the drying conditions on the various types of fuel following rain, you can develop an index of inflammability.

"If you know the relationship between the moisture content of fuels and the weather conditions — that is rainfall, drying conditions following the rain – you can develop an index based purely upon the weather effects, knowing the effect they have on the moisture of the fuels. If you have this index based upon the weather, and weather can be forecast to some extent, then you can forecast the index of inflammability or the index of fire hazard on succeeding days. You could not forecast without some knowledge of the weather what's going to happen to the moisture content upon which inflammability depends. But if you have it based entirely upon weather, then you can forecast future inflammability. That is the basis of the Wright system. . . ."

Wright remained with forestry until 1942, when he was offered a job in administration in the Northwest Territories Branch to coordinate the activities of a group who were researching the records of the Canadian arctic. After 2 years' intensive study, he found that he had acquired a wide knowledge of the Canadian arctic. Later, he was placed in charge of the eastern arctic patrol, and then appointed chief of the eastern arctic and secretary of the Northwest Territories Council. Next, he was given the District of Mackenzie to administer as well; finally, he was named chief of the Northern Administration, which covered all of Canada north of the 60th parallel.

It was an enormous load for one man, but Wright carried it until 1952 when his health failed and he was forced to retire. After a rest, he joined the faculty of Mount Allison University, teaching engineering. But for a man of Wright's talent, it was not enough to occupy all his energies. Two years later, he was persuaded to run as alderman of the local town council. He promptly became chairman of the finance committee, deputy mayor, and in 1960 mayor of Sackville — "but that was all child's play after looking after the whole of the Northwest Territories." Wright was mayor until 1967.

In 1972 Wright had a total of 45 publications to his credit, including bulletins, research reports, and contributions to different magazines. The one he regarded as his best was published in 1932. It was *Forest Fire Hazard as Developed and Conducted at the Petawawa Forest Experiment Station*. In 1944 he published *Economic Wildlife of Canada's Eastern Arctic: Caribou*, and in 1945 *The Application of Meteorology to Forest Fire Protection*, published by the Imperial Forestry Bureau at Oxford.

# 12. Broadening Horizons

In the more general field of branch development, the early twenties were notable for a broadening of horizons. This was particularly marked with the British Empire Forestry Conference, held in London in the summer of 1920 and lasting 3 days. It was attended by representatives from all the dominions and colonies, and Canada was well represented. E.H. Finlayson represented the Forestry Branch. The conference stressed the need to take stock of all the forest resources of the Empire as soon as possible and to immediately execute plans for the protection of the forests from fire, insects, and wasteful exploitation. The Empire possessed a variety of woods but the chief source of supply within the Empire for coniferous structural timbers was Canada.

The importance assigned to Canada by imperial statesmen regarding timber supply was indicated by a resolution that proposed holding the next meeting in Canada, in 1923. Throughout the conference it was repeatedly emphasized that Canada should take prompt and vigorous measures for the conservation of forest resources, both for her own needs and for those of the Empire.

The conference was held simultaneously with the Empire Timber Exhibition, where Canada was represented by a display of woods and forest products prepared by the forest products laboratories. This was described in detail by Forestry Branch Circular No. 12, "The Empire Timber Exhibition."

Further evidence of British need for Canadian cooperation in forestry matters was expressed in the request of the British Forestry Commission to the Forestry Branch for tree seed for reforesting denuded timber lands in the United Kingdom. The cooperation would extend over a 10-year period. In 1922 a tree-seed-extracting plant was erected at New Westminster, British Columbia, and for more than a decade most of the seed used by the British Forestry Commission came from this plant. The 1922 annual report noted that the following quantities of seed were collected: Sitka spruce, 3693 kg (8125 lb); Douglas-fir, 2045 kg (4500 lb); western hemlock, 200 kg (440 lb); and smaller quantities of other species. A total of 3409 kg (7500 lb) was shipped to the British Forestry Commission, and the surplus at the close of the fiscal year to the forestry authorities in Canada, elsewhere on this continent, and throughout the world. It noted: "The plant at New Westminster, while probably not the largest of the kind, is one of the most fully equipped and efficient."

The year 1920 was a busy one regarding publications and publicity. The most important publication was the manual *Methods of Communication Adapted to Forest Protection*, which dealt with the construction and use of telephones, semaphores, heliographs, etc., in the forest. The celebrated Bulletin No. 1, *Tree-planting on the Prairies of Manitoba and the North-west Territories*, went into its eighth printing, its total circulation now near 60 000. Demand for information about tree planting necessitated a new and enlarged edition of Bulletin No. 69, *Care of the woodlot*; another publication was Bulletin No. 70, *Forest fires in Canada, 1918*.

Fire prevention notices, which were found to be one of the most effective means of controlling forest fires, now had a standard size and content, but the mottoes, messages, and warnings were changed completely each year and made as striking as possible. Stickers were designed to adhere to the windshields of automobiles going into the reserves, and slips were designed to be dropped on camps by the planes patrolling the forests. Another publicity method adopted that year was the appearance of "Help Prevent Forest

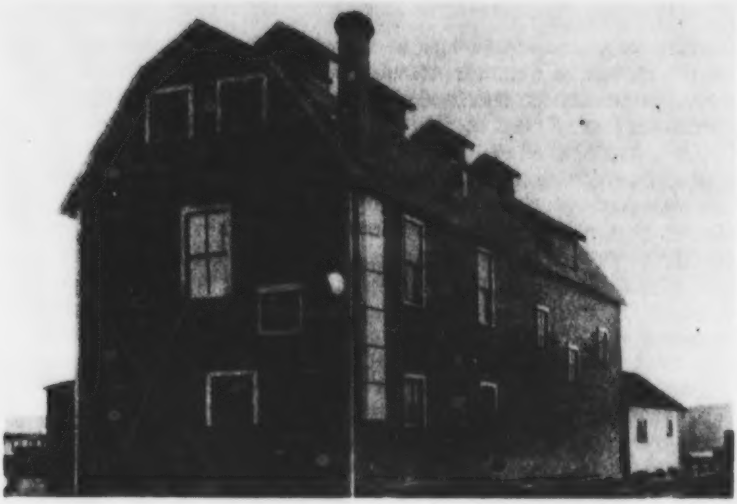


FIGURE 16. Seed extraction plant, New Westminster, British Columbia, 1922. (Forestry Canada)

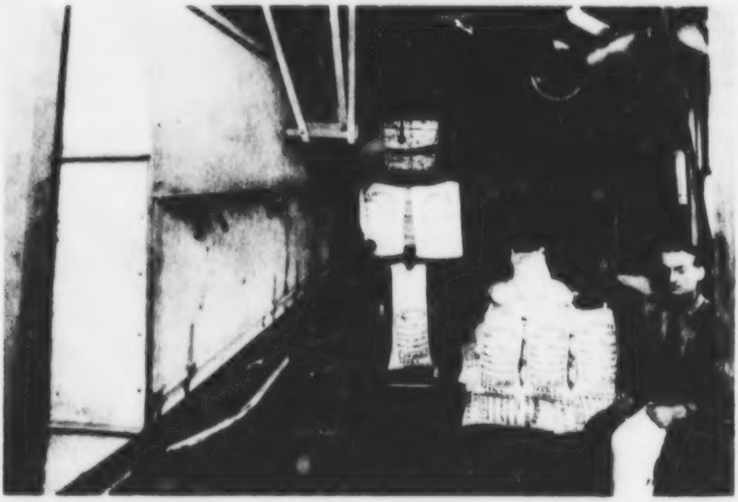


FIGURE 17. Seed extraction plant at New Westminster, British Columbia, 1924. Operated by the Dominion Forest Service from 1922 to 1930 to provide seed to the British Forestry Commission for its post-World War I planting program. (Forestry Canada)

Fires" on the cancellation stamps of several western post offices. Another important feature of the work had been newspaper releases emphasizing the importance of the forests to Canada and the need for public cooperation in controlling forest fires.

On the western forest reserves, silviculture practices were being applied to timber operations. The objective was to provide the surrounding districts with as much building

FIGURE 18. Roland D. Craig. (Forestry Canada)

material and fuel as possible while building up the reserves for the future. Silvicultural aims included the disposing of old and inferior trees to provide space for the young trees of the best species to grow as rapidly as possible. Trees killed by fires, insects, and disease were targetted to be removed after they had been spotted and marked by branch foresters.

The Forestry Branch was increased in strength and responsibilities when the Commission of Conservation was dissolved in 1921. R.D. Craig, W. Robertson, G.A. Mulloy, and E.F. McCarthy joined the branch when it took over all the forest survey and research activities of the defunct commission. Neither Craig nor Mulloy were strangers to the branch, They had both figured in its earlier history, and Robertson, too, would contribute significantly to it in the future.

By 1923 the postwar depression was being felt across the West, and serious repercussions were taking place in agriculture. Though the Forestry Branch felt some of the impact, and cattle grazing on the reserves dropped by 10 000, revenue was down only slightly. However, the work of the branch was expanding in other fields and new and important research projects were undertaken in cooperation with wood industries, particularly with the pulp and paper companies. By 1923, the parliamentary vote for forestry reached $1 million.

The acquisition of four experienced foresters from the Commission of Conservation was more than a mere quantitative gain. Roland D. Craig, for example, had quite a reputation for having compiled an inventory of the forest resources of British Columbia and was widely known and respected by foresters across Canada. McCarthy did not make the same impact as Craig, but Robertson and Mulloy are well remembered. They worked together initially on the sample plots that were laid out on the Laurentide reserve by the Commission of Conservation. J.C. Macleod, the director at Petawawa in 1973, reminisced:

"One of the fellows who really intrigued me was old Bill Robertson, then the senior silviculturalist in our Service. He came up to Petawawa from Ottawa four or five times during the season of 1930. At that time we had a three-hole biffy out on the brow of the hill overlooking the lake. One day when we were in the cookhouse . . . the students were at their table and we were all eating more or less at the same speed, and old Bill Robertson came over. To the students he really . . . looked like an old man. He sat down, said he wanted to meet us. So we all introduced ourselves around the table. We had a little general talk and then Bill said: 'You know, when you're sitting on the throne down there, you look out over the lake, but between you and the lake are an awful lot of shrubs and plants and things. Now, I want you fellows to tell me what species are there.'

"One guy said: 'You know, Mr. Robertson, you don't see very many, except from the center hole. I always sit on an end hole.' Nobody ever closed the door, of course. But Bill took it seriously. He didn't laugh at this . . . at all. Everybody else did, but he had a point in mind. He said: 'Well, even walking down there, you see them all briefly. When you're sitting there, you must ponder what's out there. And now, I'll start with you, George McGee.' George McGee was a third year forester, U.N.B., and I knew him well. George said:

'Well, there's some corollas,' and there's this, and there's that, and he named off the scientific names of maybe five plants . . . and a long pause, and then Bill said: 'Is that all you saw?' 'That's all I can remember.' So he went around the table and several of the other fellows added two or three more. Bill Robertson said: 'Let this be a lesson to you. Think forestry, think the forest all the time, and look, for Heaven's sake, look, and recognize what you see.

There are 24 species . . . sitting right there in front of your eyes; trees, plants, shrubs and stuff. Now, for Heaven's sake, get with it, eh?'

"Well, you know, it affected everybody. Every time anybody squatted up there, from then on, from that group, they started thinking: 'What the hang is that? What's this? Why are these things growing in such association as they do?' An introduction to a college you'd never get in school."

Allan Mulloy, formerly associated with the buffalo enumeration, and assistant chief of silviculture research, was a different type of man. R.H. Candy, a former superintendent of the Petawawa Forest Experiment Station, presented a penetrating and brief insight into Mulloy's capabilities:

"Allan was, of course, a very nervous man and quite ill, but he was just the opposite to Mr. Robertson. He was quite a pushy man and he had a remarkable ability to analyze reports that came in from different parts of the country, not only our own forest service, but other forest services, and his analyses were so strict and so clean that on many occasions he was able to prove that they were wrong. In fact I have actually seen him take the same data they used and prove something entirely different to what the writer had tried to prove himself."

Perhaps the best appraisal of the two men was offered by Arthur Bickerstaff, then director of the Forest Management Institute in Ottawa:

"Bill Robertson and Allan Mulloy . . . were extremely dissimilar in temperament. You might say that Bill Robertson was a qualitative man and Allan Mulloy was a quantitative man. . . . Bill Robertson made outstanding contributions in the silvicultural and ecological fields. There was no doubt that he evaluated what was going to happen from the silvicultural standpoint in many areas in Canada much better than almost any person I knew. His weakness was that when he came to expressing things in quantitative terms, he ran into problems. Mulloy, on first acquaintance, gave a rather different impression. He tended to be rather sarcastic, very biting in his criticisms, but he had one of the keenest minds of any man I have ever had occasion to meet. . . ."

The Forestry Branch fared well in staff additions arising from the dissolution of the Commission of Conservation.

# 13. The Fruitful and Fateful Twenties

The twenties began promisingly for the Forestry Branch and ended calamitously. An omen of future developments might have been seen in the dissolution of the Commission of Conservation. The government of the day did not share the views of the government of 1912 regarding the urgent need for a strong conservation policy, and the astute Campbell had ceased to be effective after his accident in 1918. Although the branch continued to register important achievements in forestry, the record of most of these achievements was found in the branch's annual report, which was buried in the back of the Department of the Interior's annual report and given decreasing space each year. These yearly records of accomplishments were hardly front page news in any newspaper. Usually interspersed with dry statistics and ponderous official observations, these records impressed only the initiated.

Only in one field did the Forestry Branch deal directly with the public in such a way as to impress the average voter with its obvious value. The Tree-Planting Division, which worked directly with the public, offered positive evidence of the value of trees and tried to inspire a concern for them.

Twenty-five years after the first bundles of seedlings were delivered to the western settlers, the results of this cooperative venture had surpassed even the most optimistic hopes held at the beginning of the century. Across the great, bald, windswept Prairies an observer in the early twenties could see the magic transformation of thousands of stark, lonely homes on empty acres of sandy soil into farms enshrining neatly planted groves of maple, Russian poplar, willow, and ash. Often, from the highways to the houses he could see short avenues of maple, bordered by caragana hedges and dotted with the occasional white spruce.

On the farm plantation there were sometimes as many as 15 000 healthy growing trees. Apart from their ornamental value, the trees served the vital purpose of shelterbelts, standing like companies of closely grouped green-clad infantry, which protected the homestead from the icy blast of winter storms, reduced farm–home heating costs, and kept paths clear to barns and outbuildings. Many a hard-pressed western farmer of those bitter postwar depression days was deterred by his deep affection for his well-treed homestead, mortgage and all, from quitting his land and joining the city breadlines.

In the spring of 1923, Campbell finally resigned. For the previous 4 years, Dwight had been functioning as acting director, but in 1922, apparently sensing that he was not likely to be selected to replace Campbell, he accepted an appointment at the University of Toronto, and the Forestry Branch lost one of its more research-minded leaders. Fifty years later Dwight refused to discuss this beyond admitting that he differed with others in the leadership of the branch and consequently decided to leave; but Dwight was deeply concerned with research, whereas E.H. Finlayson, his successor as acting director, was unsympathetic to research. In view of the developments over the succeeding 10 years, it is interesting to speculate how the history of the branch might have developed if Dwight had succeeded Campbell.

Ernest Herbert Finlayson was born in Toronto in 1887. He graduated from the University of Toronto, where he studied engineering and forestry. He entered the federal Forestry Branch in 1910, while still a student in forestry, and spent two summers on surveys to establish the Rocky Mountains Forest Reserve boundaries. He joined the staff permanently in 1912 when appointed inspector of fire ranging and reorganized the fire ranging services in the Prairies and in the Northwest Territories. He also organized and supervised the railway fire protection work in the West for the Board of Railway Commissioners.

FIGURE 19. E.H. Finlayson, director of Dominion Forest Service 1924-36. (Forestry Canada)

In 1914 he succeeded W.N. Millar as district forest inspector of reserves in Alberta, the largest and most important of the administrative units in those days. He moved to Ottawa in 1920 as forest protection specialist, and attended the Empire Forestry Conference in London as Canadian representative. In 1923, as vice chairman, he organized and managed the Second Empire Forestry Conference held in Canada and notable for its efficient organization and smooth functioning. The Royal Commission on Pulpwood was created the same year and Finlayson was appointed secretary and technical forest adviser to that body. He functioned as acting director of the Forestry Branch as well that year, and in April 1925 his appointment as director of forestry was announced, retroactive to April 1924. He had certainly proven his organizing ability, and the choice seemed logical. D. Roy Cameron was appointed assistant director.

In 1923, a year before the Forestry Branch reached the quarter-century mark, it was renamed the Dominion Forest Service. Another quarter century would pass before it would return to its original name. Finlayson marked the occasion of the service's 25th birthday by reviewing briefly its progress since its inception. At that point the Dominion Forest Service had reached a new peak in its administrative career. For the fiscal year ending March 31, 1924, the service earned from the 30 forest reserves in its charge $150 887.37. This sum represented the highest revenue in the history of the service and included earnings from timber sales, timber fees and dues, timber seizures, grazing permits and seizures, surface rentals, and nursery stock, etc. The list indicated the wide variety of enterprises in which the service was engaged.

For forest protection some 240 fire rangers were employed by the service, and 1258 fires on Dominion lands were reported. The service and the Royal Canadian Air Force were working effectively towards improving the organization and developing new equipment that would ensure maximum efficiency at the most reasonable cost in the still new forest air patrol. On the ground, work continued in the building of cabins, ranger stations, stables, bridges, lookout towers, roads, trails, telephone lines, and fireguards. Other fields of activity included artificial reforestation on the reserves, the supervision of grazing, the extension of reserve boundaries, the direction of prairie tree planting, the supervision of timber operations on the reserves, forest research at the new experiment station at Petawawa, and the enlargement of the capacity for research at the forest products laboratories in Montreal. The 25-year-old Dominion Forest Service was doing an immense job.

The rapid growth of the pulp and paper industry in Canada in the first decades of this century had resulted in a demand for new and better technology, and this had led to the establishment of the forest products laboratories in Montreal. From the beginning of the laboratories' history, the demand from the pulp and paper industry was insistent, until the industry itself felt that it required a research facility devoted solely to pulp and paper.

In the summer of 1927 the forest products laboratories moved to Ottawa. The following year the administration and control of the cooperation research work of what would become known as the Pulp and Paper Research Institute of Canada was vested in a joint committee made up of members of the executive council of the Pulp and Paper Association and representatives of the federal government and of McGill.

After further revisions of agreements between the federal government and the association, the Pulp and Paper Division of the forest products laboratories moved in 1928 into the institute building on the McGill campus. The building was formally opened by Governor-General Viscount Willingdon in January 1929. The establishment of the Pulp and

Paper Research Institute of Canada in Montreal and the relocation of the forest products laboratories to Ottawa and Vancouver set the stage for a movement away from the general exploratory type of research into some intensive scientific research.

Meanwhile, the Vancouver laboratory, originally established to investigate aircraft structural woods, continued to function as a peacetime research unit. Because the war had ended the year the laboratory began to function, original plans had to be revised. In general, from the end of the war to the beginning of the thirties, the work of the west coast laboratory expanded along two lines: timber mechanics and timber products. The original staff of the laboratory comprised Loren L. Brown, superintendent; J.W. Johnson, computing engineer; two testing-machine operators, J.A. Carson and William Templeton; a carpenter, Arthur White; and a stenographer–bookkeeper, M.S. Carment. In the next 2 years there was a rapid turnover of staff: three resignations in the 1st year and six in the 2nd.

In spite of these problems the Vancouver laboratory soon began to attract the attention of various west coast forestry interests. Situated on the grounds of the new University of British Columbia, with which a working agreement was reached in 1924, it was frequently visited by members of the British Columbia Forest Service, the Timber Industries Council, and the British Columbia Lumber and Shingle Manufacturers Association, as well as by regular visitors to the university. The superintendent of the Forest Products Research Laboratory in Western Australia visited, and a basis for future cooperation in forest products research was established between Australia and Canada.

The British government expressed a keen interest in using British Columbia wood for postwar industry in Great Britain, resulting in an eventual expansion of British Columbia timber exports to the United Kingdom. When Australia inquired about the properties and availability of Sitka spruce for use in constructing commercial aircraft, the original wartime testing plans were revived. Inquiries for special tests rose from 8 in 1919 to 350 in 1927–28, and there were inquiries regarding more than 1000 other tests. From the beginning the laboratory cooperated closely with industry.

It was in the mid-twenties, when it seemed that the business cycle was on the upswing and the country was teeming with industrial activities, that the forest reserves appeared to take on an entirely new look. Numerous small and large lumber mills were operating across the West in full production. They had all become a part of a national forests operation. As the mills thrived on the raw material from the forests, their productivity was reflected in the birth of numerous staple industries in nearby communities that met the current demand for railway ties, poles, fuel, and other wood products manufactured by hand. The opportunities for small-scale capital investment expanded and seasonal employment problems diminished. The director of forestry wrote in 1927: "The national forests, in fact, have become an integral part of the life of the communities adjacent to them, supplying as they do a commodity basic to the economic development of the country."

Timber sales in the national forests were subject to cutting restrictions designed to improve the growth rate in the remaining stand, or to ensure the reproduction of the more valuable species. They were also subject to standards of utilization and methods of brush disposal. Administration of these areas by the Dominion Forest Service required that trees for cutting be marked and that low stumps be left. All marketable material had to be taken out. All brush had to be piled and burned or, in some cases, lopped and scattered. At first, these seemingly strict regulations were resented, but eventually managers and timber operators cooperated fully with forest service officials.

The opening at that time in Pine Falls of the Manitoba Paper Company's plant, which drew on some of the national forests for part of its pulpwood supplies, significantly affected the life of many people in that part of Manitoba and northern Saskatchewan. It provided a market for hitherto unexploited balsam fir and black spruce. The opening of a local market for pulpwood brought financial help to these areas and facilitated the clearing of agricultural lands.

By 1927, 17 nurseries had been established in the national forests and extensive reforestation by planting was being prepared. Forest surveys were being increased in the three Prairie provinces. Working plans were prepared after these surveys as the importance of forest management began to attract interest in Canada. Such working-plan surveys were comparatively rare in the country. They marked the beginning of sustained-yield management of the national forests. It was the beginning of the theory of living off the interest of the forests rather than cutting enormous quantities of wood, ignoring future yield and thereby destroying forest capital.

In addition, the national forests were becoming more and more the favorite haunt of summer holidayers. The improved transportation facilities of these vast wooded areas, still largely in their virgin state, made them an irresistible attraction and a refuge from the staid and formal resorts of earlier days. Apart from their value as forest properties, the national forests had become an increasingly valuable asset to the provinces in which they were situated. Soon, the provinces would realize this.

During each of the ensuing years of the twenties, the forest service devoted increasing attention to publicity and education to stimulate a much-needed public interest in the care of Canada's forests. A "Save the Forest" week, April 27–May 3, 1923, was very successful. One feature of the campaign was an essay contest open to all schoolchildren in Canada under the age of 16. The campaign was strongly supported by the media and the essay contest attracted keen interest. The cooperation of service clubs was enlisted. Regular weekly meetings were devoted to the subject of forestry and special speakers were secured to address the clubs in many cases. Over national and provincial radio networks, the minister of the Interior, several provincial premiers, and members of the federal and provincial forest services addressed listeners on the vital topic of forest protection. Special postal cancellation stamps were again introduced bearing the injunction "Help Prevent Forest Fires." Two of the largest retail chains in Canada enclosed in all outgoing mail that week fire warning slips supplied by the Dominion Forest Service.

In 1925, "Save the Forest" week was renewed and was even more effective. A National Advisory Committee was formed, representing the press, the wood-using industries, and service clubs, as well as national and provincial forest services. Some 213 250 pieces of publicity material were distributed, including blotters, booklets, school programs, and charts. Members of the service's publicity division visited summer camps supervising hikes, instructing in tree identification, promoting the idea of forest fire prevention, and conducting talks around the campfire.

Among the many publications the service prepared that year was a pamphlet entitled "Forestry Lessons," directed particularly to students in the lower school grades and consisting of a series of simple forest studies. Written by R.M. Watt, who had gone to Ottawa from Dauphin and who had an undoubted flair for public relations, it was first distributed to the provincial school authorities in 1928. It has been in demand ever since.

In 1928 the director of forestry wrote in his annual report that an enlightened public was recognizing the importance of science in the economic development of natural resources throughout Canada. Finlayson may have correctly assessed the public attitude towards the work of the forest service, but he failed to convince the politicians and the Liberal party. The King administration was determined to rid itself of federal responsibility and cost for the forest reserves. The federal government could save at least $1 million per year by turning over the national forests to the western provinces, to which they actually belonged according to the terms of the British North America Act. Though the forest service blamed R.B. Bennett's succeeding government for the transfer of the forest reserves, the deal was made by the previous King administration; Bennett merely ensured that the forest service appropriation was cut accordingly.

Despite a fierce last-ditch battle waged by Finlayson onward from 1926, when he began to recognize the mounting opposition, and despite the service's outstanding administration of the reserves, agreements were signed with the western provinces in 1929 for the return of their natural resources, including the forests. An internal service memorandum summed up the event:

> "In one swift move the entire administrative function of the Service was removed with regard to the protection and management of the forest lands in the west. Some idea of the valuable work done by the Forest Service over the previous 30 years in building up a careful and extensive administrative system for these (23 million) square miles of national forests was evinced in the action taken by the newly established provincial forest services. In all three of the prairie provinces the Dominion timber regulations were adopted almost without change. The 'Timber Sale' method of disposal developed by the Forest Service also found general favor and was applied in all cases throughout the west. One painful aftermath of the transfer was the release of some 400 members of the Dominion Forest Service employed in the western districts. Many, however, were taken into the provincial services."

And many were not.

# 14. Effects of the Decision

The government's decision to transfer responsibility for the natural resources of the western provinces, and in particular the forests, was hardly unexpected by the Dominion Forest Service. It had been clearly understood from the beginning that these resources were being held in trust until the provinces concerned were in a position to claim them. This, however, was not quite the case with the forest reserves. They were no bargain at that point, and the western provinces showed an understandable reluctance to take them over. True, in 1928, for instance, the Dominion Forest Service showed a net revenue from all sources of $228 559.33, and Finlayson was quick to point out that the increase of revenue for the year was higher than for any of the preceding 5 years. What he did not mention in his annual report was the total budget of the service, which was close to $1.5 million.

Finlayson, however, was above all a fighter, and he fought hard to retain at least the national forest; had the federal government been willing, likely a deal could have been struck. It did not turn over the national parks, for instance, and even Riding Mountain was converted from a forest reserve to a national park and remained under federal control.

Several veterans have commented on Finlayson's fight to retain the forest reserves, and the effect of their loss on the service. Said D. Roy Cameron:

> "The transfer of resources and the onset of the depression almost meant the demise of the Dominion Forest Service. I think R.B. Bennett would have personally wiped us out, but other counsel prevailed. Research and statistics collection for fire losses and so forth were all that remained excepting the Forest Products Labs. The staff were, of course, decimated. The possession of actively operating forest experiment stations and the labs saved the day. The tree planting work was salvaged by Agriculture, which was afforded more money than was allotted to the Department of the Interior."

J.D.B. Harrison talked about Finlayson and the transfer of resources:

> "We began to get a regular flood of instructions from Ottawa. I'm talking about the Winnipeg office now, where I was. Finlayson apparently had had the greatest difficulty in accepting the fact that the forest reserves were going to go. We hoped that he was making satisfactory arrangements, looking after personnel and all that, but he wasn't doing anything of the sort. He just didn't accept that the forest reserves were going to go and, when they went, it made quite a stir. . . ."

Beginning in 1925, almost from the time he was named director, Finlayson fought like a tiger to retain the forest reserves as national forests. A long series of detailed memoranda consisting of carefully reasoned arguments and supporting statistics why the federal government should retain its national forests testify to Finlayson's fight. His final memorandum, addressed to Acting Deputy Minister R.A. Gibson and dated December 6, 1929, summarizes a carefully reasoned position on the transfer of natural resources:

> "Over a period of five years we have submitted numerous reports dealing with the natural resources question. In all of those reports we have emphasized:
>
> 1. The seriousness of the timber situation in Canada, due to exhaustive methods of

exploitation and devastation by fire; and that this situation comprises a national problem far transcending provincial considerations.

2. That the provinces, if they take over the national forests, cannot possibly finance the intensive administration required, and that failure to do so will further aggravate the very serious situation which exists.

3. That, in the premises, the transfer of these areas by the Dominion to the provinces is contrary to the national interest, and if consummated will constitute a shifting of responsibilities which recipient administrations will be unable to meet.

4. That although the transfer of such responsibilities may temporarily, and in relatively small measure, reduce federal expenditures, it is only a question of time until the federal government will have to financially aid the provinces in their forestry programs.

"The past fire season showed all too clearly that Canada has got to provide more intensive protection. Of the four western provinces, British Columbia is the only one that at present has direct responsibilities in forest protection, and of such provinces is probably the most advanced. Nevertheless, in that province the degree of protection applied on provincial lands does not approach that on federal lands; consequently the losses were relatively much greater.

"It is surely the responsibility of the federal government to give the lead to the provinces on forest policy and administration. This lead cannot be properly given, nor can the provinces logically be expected to accept such leadership, unless definite administrative functions be exercised by the Dominion. Therefore, even if the entire national forest area were not retained, it is absolutely essential that an appreciable part of it should be, in order that the necessary demonstration, experiment and research may be provided.

"We have on many occasions emphasized the extent to which the federal government of the United States participated in and gives assistance to state forestry effort. Far from decreasing the national forest area in that country, the area is being constantly increased. Also, the reaction of the past serious fire season in that country is not to throw the load upon the individual states; rather, there is a general move of all interested bodies in the land to increase the federal responsibility.

"In the case of Alberta, and after most careful enquiry into all phases of the matter, it was definitely agreed that Canada should retain and administer the Rocky Mountain, the Cypress Hills and the Cooking Lake Forest Reserves. There was absolute agreement of the soundness of the principles involved.

"In Manitoba, the province is willing to leave the reserves under federal control. But apparently there is disinclination on the part of the federal government to retain such control, presumably on the ground that national forests have not so far been established in the older eastern provinces. To this there are two answers: (a) That the eastern provinces are much more densely populated, and hence have sources of revenue not enjoyed to the same extent in the west; (b) Aside from funds, the very fact that neither Nova Scotia nor New Brunswick have even established provincial forest reserves is proof conclusive that weaker provinces are unlikely to observe the fundamental principle of forestry — permanent forests. Indeed, although Quebec and Ontario have for many years had forest reserves of a kind, it is only latterly that there is much evidence that they intend to administer them properly. It may confidently be stated that it is largely due to the fact that the federal service has built up these forest reserves in western Canada, and has administered them as such, that it has been possible as a result of national conferences to convince the provinces of the soundness of the policy.

"The preliminary negotiations with British Columbia also indicated agreement on the part of that province that Canada should retain substantial areas as national forests.

"In the circumstances, it is necessary to urge upon the Dominion Government that the wholesale transfer of the forest reserves in Western Canada to the provinces would be a retrograde step; and that it is a measure which would definitely retard the advancement o forestry in Canada, at a time when the people of this Dominion are looking for advance rather than retrogression.

"In view of the fact that our views have been placed by the Department before the Prime Minister, we are justified in assuming that before any final decision is reached tha matter will receive that consideration in Council which its importance demands."

The government's flat rejection of this position was, in fact, a rejection of everything that Finlayson had fought for, and made a mockery of what he believed in. The effect on the service of the transfer of resources was, of course, traumatic. The service appropriation for forestry was slashed from $1 574 313 in 1929–30 to $266 000 in 1932–33, that is, by 83.1%. An unsigned study, "Proposed Re-Alignment of Federal Functions in Respect of the Natural Resources of Canada," produced in January 1933, noted that of all the reductions that took place in the Department of the Interior, the slash in the forestry budget was exceeded only by that of Dominion Lands. After noting the amounts and percentages o reductions in the various divisions, which included Observatories, Dominion Lands, Wate Power, Forest Service, National Development, Geodetic, Topographic, National Parks Northwest Territories, and the Yukon between 1929–30 and 1932–33, the study observed:

> "The most startling point in the foregoing table is that . . . the percentage reductio over the four years in the case of Dominion Lands was 86.7 per cent. As against this, th percentage reduction over the same period applied to the Forest Service was 83.1 per cent The Forest Service, however, continues its silvicultural research and National inventor activities from Atlantic to Pacific, and also maintains the Forest Products Laboratories, th work of which was in no manner related to the natural resources transfer. It is at onc perceived that the relative decreases meted out to these two services are entirely out o proportion, and very much to the disadvantage of the Forest Service.
>
> "The situation, however, is even worse than the foregoing figures indicate, for, out o the large amount voted the Department under the Item, Civil Government Salaries durin the current year, the Dominion Lands Administration secured approximately $57,00 whereas the Forest Service secured but $16,300."

The study estimated that the transfer of resources had cut the responsibilities of th forest service by half, but its budget had been cut to approximately one-sixth. It noted tha the service had made a voluntary cut of one-half in its estimates, based on the loss of it administrative function — the only branch to do so in the department — and had then bee told to cut its estimates in half again. Forestry was decidedly out of favor with the Benne regime.

The following table emphasized the imbalance.

| | Annual Production of Wealth | | Federal Appropriation | |
|---|---|---|---|---|
| | 1930 | % | 1932-33 | % |
| Agriculture | $ 1 346 363 659 | 61.9 | $ 8 490 615 | 70.6 |
| Forests | 440 352 351 | 20.2 | 283 323 | 2.4 |
| Mines | 325 184 050 | 14.9 | 1 101 724 | 9.2 |
| Fisheries | 63 743 253 | 2.9 | 2 142 166 | 17.8 |

Agriculture, which made the largest contribution to national wealth, received the greatest amount of federal expenditures (70.6%). Forestry, second only to agriculture as a contributor to national wealth, received the smallest federal expenditure (2.4%). Federal appropriations for fisheries, which contributed less than 3% to national wealth, were seven times the appropriation for forestry, at 17.8%.

The lengthy study concluded by proposing a new Department of Conservation and Industrial Development that would include the Bureau of Mines, the Bureau of Geology, the Bureau of Forestry, the Bureau of Water Power, the Bureau of Surveys, and the Bureau of National Development. It would consolidate the rest of the Department of the Interior with Indian Affairs, Immigration, the National Research Institute, and Trade and Commerce.

Also in the records of the period is an 11-page document, unsigned, but sounding very much like Roland D. Craig, entitled "National Forestry Affairs." It noted that the forest service was anxious to divorce itself from the Department of the Interior and become the Bureau of Forestry attached to the Department of Agriculture. Leaders in the forest service were seeking a better environment in which to work than the decaying and eroding Department of the Interior; however, they would wait another 5 years for a doubtful deliverance.

Meanwhile, the practical effects of the natural resources decision were evident in the service. A considerably reduced but more compact unit was taking shape, its head office and main forest products laboratory located at Ottawa, an experimental station at nearby Petawawa, a branch laboratory in Vancouver, and a segment of staff at the Pulp and Paper Research Institute in Montreal.

The transfer had signaled a fundamental change in the outlook and activities of the service. It had to turn from practical administration to the broad and important field of scientific forest research, albeit with a director for whom scientific research was not a priority.

By 1930 the details of the transfer were completed, and all vestiges of the old branch's administrative functions in the West had been passed on to new hands. Perhaps the most melancholy decision of all, and one that would haunt old-timers in the service who were associated with the period of its greatest popularity in the West, was the decision to transfer the operations of the Tree-Planting Division with its nurseries at Indian Head and Brandon to the Department of Agriculture. There were people in the service even 40 years later who thought it was a bad decision.

Finlayson rallied his decimated forces. In the 1931 annual report he wrote: "The Service, however, continues to exercise functions which are Dominion-wide; in fact, its functions in the field of forestry are directly comparable to those exercised by the Dominion in the fields of agriculture and mining, where federal activity is concentrated on investigation, research, experiment and leadership to the provinces and to industry."

# 15. New Beginnings

Despite the steady expansion in Canadian mining and in the manufacturing industries during the twenties, the forest industry was still the second most important industry in the country, surpassed only by agriculture. Forestry would continue to demand the active interest and attention of the federal government. Forest service attention was concentrated on, in Finlayson's words as expressed in the 1932–33 annual report, "the startling decrease in the wood capital of the Dominion." This decrease was the result of exploitation, fire, insect, and disease. Finlayson emphasized that the country's forest industry must be arranged so that the "depletion of wood through use and wastage shall not exceed the amount of the annual increment in the forest due to growth." The story of the service henceforth would be closely linked with progress in scientific investigation and the development of cultural methods as an aid in sustaining this great national and industrial asset.

Thus, in 1931, the small organization known then as the Dominion Forest Service was operating in the field of forest economics, silviculture research, fire protection research, and the expanding field of forest products research. In forest economics, the service directed its attention to gathering and preparing data designed clearly to reveal the current trends in the industry, both nationally and internationally. The immediate objective of this work was to assist the industry in adjusting itself to domestic and foreign market requirements. It involved a stocktaking of forest reserves and an analysis of the factors contributing to the depletion of timber supplies, with a view to balancing Canada's wood budget.

In silviculture research, the service pursued its studies of the rate and conditions of growth of Canadian tree species and forest types. The aim here was to establish the principles of sustained yield and cutting methods that would provide for ample regeneration. The work in this field involved the operation of its experimental station, demonstration forests, and close cooperation with the provincial forest services and the forest industries. Together with economic and silviculture research, the service carried out several other technical investigations, including the preparation of volume and yield tables to assist foresters and others in determining current volumes, potential growth, and final yield of forest areas under management. Plans of scientific forest management were prepared, the problem of slash disposal was studied, and the function of the country's watershed protection areas was investigated.

Although forest protection was by now a provincial responsibility, the federal service continued to make important contributions. The Dominion Forest Service collected and prepared annual forest fire information for national distribution. The protection division studied fire weather and fire hazards. At the experiment station it studied all phases of forest protection to improve and standardize countrywide fire protection methods.

In the field of forest products research, including developments in pulp and paper research, the service maintained an active interest in its laboratories at Ottawa and Vancouver as well as at the Pulp and Paper Research Institute of Canada at Montreal. The goal was to find ways of increasing the current utilization of all wood by finding more efficient methods of manufacture. One target was the reduction of the vast amount of waste incurred in wood manufacture; another was to replace, wherever possible, the use of imported wood by Canadian wood.

During the early thirties, Finlayson's assistants, particularly Robertson and Roland

Craig, endeavored to support their harassed and troubled director in his efforts to check the erosion of the service's budget and manpower. But Finlayson showed more and more the toll that the survival struggle was taking on his health. His bouts of amnesia became more frequent. On the morning of February 26, 1936, he left his home, presumably bound for his office. He was never seen again.

A statement prepared by Cameron read in part:

> "The transfer of natural resources in 1930 had serious effects on the work of the Forest Service, and the necessity for drastic curtailment of personnel and realignment of activities weighed heavily on the Director's mind. Intermittent illnesses, due to an ulcerous condition of the stomach, were from this time on complicated by periods of nervous exhaustion. The extra burden of work imposed by responsilibity for preparation of the forestry and timber sections of the Dominion's case for presentation before the Saskatchewan and Alberta Resources Commissions was undoubtedly responsible, in part at least, for Mr. Finlayson's serious nervous collapse in April, 1935. It was hoped that attendance at the Fourth Empire Forestry Conference in South Africa in the summer of 1935, following a spring holiday in the West Indies, would give the Director opportunity for making a complete recovery. Unfortunately these expectations were not realized. He suffered recurrent nervous collapses and mental disturbances which culminated in his disappearance on February 26th last, since which date no trace or clue has been available.
>
> "Mr. Finlayson was devoted to his work. Temperamentally he was what is known as a worrier, and was unable to obtain necessary relaxation by diversion in games or social activities. It is quite patent to all those who have been in close contact with him that his unhappy breakdown has been brought on by the cares of office during the trying times of recent years."

So concluded the career of the forest service's third director. Had Finlayson won his fight to retain the national forest reserves, his ultimate amnesia might never have occurred. The history of the service might have been different as well. The alienation of the Prairies from Ottawa might have been tempered by a forestry presence that had done so much in the first 30 years of this century to demonstrate federal concern for the prairie farmer. In addition, Finlayson bitterly opposed Campbell's program for developing the research capacity of the service. Had Finlayson concentrated his undoubted energies on building up the research function, the service would not have found itself so vulnerable when the crunch came in 1929. Finlayson's role as director of the Dominion Forest Service, contrasted with the roles of the two previous directors, emphasizes the decisive factor of leadership in the history and fate of an organization.

The annual report of the director of forestry for the fiscal year ending March 31, 1936 bore Finlayson's name as the author and was the last annual report of the director of forestry. In that year the moribund Department of the Interior was replaced by the Department of Mines and Resources which absorbed the Dominion Forest Service into one of its four separate branches: the Bureau of the Northwest Territories and Yukon Affairs, the Land Registry, the National Parks Bureau, and the Dominion Forest Service. The Dominion Forest Service director was no longer a director presenting an annual report but an anonymous Dominion forester, who presented an unsigned report.

Surprisingly, the Dominion Forest Service survived this unpromising transfer and even grew stronger. The experience suggests that Craig was right when he contended in a memo to Finlayson on January 16, 1932 that forestry was vital to the economy of the country and that the federal government, whether it knew it or not, had to play a decisive role in developing the necessary know-how to put forestry on a basis of sustained yield. It was the development of this know-how that would henceforth involve the resources of the Dominion Forest Service.

# 16. Forest Economics and the Manitoba Pulpwood Survey

Forest economics made important strides in the Dominion Forest Service during the thirties. The Economics Division initiated one of the most significant developments in the history of forestry when it pioneered the technique of forest air survey. According to service records, this technique started tentatively as early as 1927 when a forest survey of pulpwood was begun in Manitoba. A series of maps was obtained from the Topographical Survey Branch that showed not only the topographical features but also the boundaries of various timber types on the areas to be covered. The maps had been plotted from oblique air photographs.

The man in charge of one survey party in Manitoba was H.E. (Si) Seely, who after using these air photographs in the field, was called to Ottawa by Roland Craig to work on long-range plans for using the technique on forest surveys. The Depression and the transfer of resourses in the Prairie provinces had a disturbing effect on the first stages of this new work and, although Seely obtained occasional assistance, it was not until 1937 that several foresters were permanently assigned to him. Throughout these first stages he worked under Craig's direction and encouragement in the Economics Division.

The forest air survey section completed several maps for the national forest inventory started in 1929 and later abandoned. While practical advantage was being taken of air photographs, new and more advanced theories were examined by Seely. By 1932, the shadow and oblique methods of determining tree heights from these photographs had been developed. Early investigations also showed the special value of winter photography for forestry purposes. By 1935, the basis had been laid for the detailed quantitative estimating of timber stands from air photography and for the forestry tricamera method of air photography. At the same time, infrared photography was investigated for application to forestry. A transfer device was tested and subsequently patented jointly by the Department of Mines and Resources and Seely. It became the prototype of instruments that were later widely used to plot detail from air photographs.

The early beginnings merely pointed the way to far more detailed research carried out in forest air surveying in succeeding years. As the staff was gradually increased, many new ideas were developed and new contributions were made in this intriguing fresh field. Development of the use of air photographs for site classification enabled the woods operator to determine whether certain areas contained enough commercial species to make the movement of men and machinery worthwhile. The use of air photographs for this purpose saved considerable time and money by eliminating the need for surveying on foot.

Throughout the rest of the thirties to the start of World War II, the demand for forests maps continued, pacing the intensive amount of research being done. Many forested areas on federally administered lands and, in special instances, on provincial lands were typed and estimated by this method.

Seely recalled those early days. He was born in Saint John, New Brunswick, in 1898 and graduated from the University of New Brunswick with a B.Sc. in forestry. He started with the Forestry Branch in 1920 in Saskatchewan, where he worked both in the Porcupine Forest Reserve and the Sturgeon Forest Reserve, which later became Prince Albert National Park. He discussed his work in Ottawa in the thirties:

"One of the first problems I had was to develop a photogrammetric method of measuring the tree heights in the aerial photographs. . . . The Topographical Survey had developed perspective grids for mapping; that was all on the ground plane. But when it came to the perspective image of a tree, and some of these trees in the foreground of the ordinary . . . photograph were of considerable size . . . , my problem was to mathematically determine the basis for a grid or some measuring device which would measure these tree heights on the photographs. This I was able to do. . . .

"I remember that the Director, Mr. E.H. Finlayson, said that he could understand the . . . identification of species . . . but he couldn't understand how we could determine heights of the trees from photographs. So a test was decided on, and certain trees were marked on these excellent photographs of Petawawa, and we were to test them against the records of measurement at the station. I think that there was a great lack of faith in the idea at that time that you could, either by measuring the shadow or by measuring the image of the tree, determine the height of the tree. . . . I was sent up to Petawawa to check that certain trees were . . . marked off on the photographs. . . . The first tree was a maple in plot No. 7, near the headquarters. . . . That tree, instead of being over a hundred feet, as shown by the Forestry Branch records, . . . was actually about 60 feet. . . . Altogether the air photo measurements from shadows in the winter were remarkably close. . . . They were far better than the records taken on the ground by students in the summer."

Seely shortly afterwards found himself head of a small forest inventory section in the

FIGURE 20. H.E. (Si) Seely. (Forestry Canada)

Forest Economics Division, and he remained there until World War II. Jack Robinson, who had a long association with Seely in aerial photography development, recalled another important contribution by Seely:

> "In 1937 an inventory was required of the Riding Mountain National Park. . . . They wanted to have an inventory particularly because the settlers in that area had timber rights. Now, to do a ground survey, it was estimated the cost would be $60,000, and the federal government simply didn't have $60,000 to spend on the survey, and Si Seely very boldly went up to the . . . Dominion Forester, Roy Cameron, and said he could have it done for $6,000 by air photography. Now there would be a slight additional cost because the mapping had to be done from air photography, and the compilation done. But in those days, people weren't paid much, . . . and several of us were brought back. We were paid the princely sum of $120 a month. I forget our official title, but it sounded very important.
>
> "We mapped all the forests on the Riding Mountain, prepared timber estimates from it. The federal government didn't quite believe it and they sent some parties up for the survey, and in the long run the air photographs were accepted and the work of the ground survey simply used as a check on the reliability of the survey as a whole. This was the first major job done on forest inventory from air photographs alone. . . ."

The Economics Division tackled other problems. The first of these was the national forest inventory that the forest service had undertaken after a decision taken at the 1929 Dominion–Provincial Conference. A survey of forest conditions including a rate-of-growth survey was to be carried out on a cooperative basis between the federal and provincial authorities. The federal authorities were responsible for directing the work and compiling and publishing the survey data. The target date for completion was 1934, but financial difficulties forced a temporary abandonment of the project.

During the thirties the Economics Division built up its service of collecting and maintaining a central source of statistical information on all phases of production, employment, trade in the forest industry, and the forest resources of the country. As the decade ended and the nation adjusted to a revived economic foundation, a modest retrieval of earlier plans took place. The national forest inventory was resumed as more accurate reports became available from forest surveys undertaken by the provinces. A major step in realizing the persistent effort towards that goal was the publication in 1938 of Bulletin No. 92, *Economic aspects of the forest and forest industries of Canada*. Prepared by J.D.B. Harrison of the Economics Division, it presented a broad picture of the forest industry of Canada at that time. Harrison showed the close relationship of Canada's forest resources to her industrial development and the large volume of foreign trade in wood and paper products that the country enjoyed. It made a strong case for an aggressive forestry policy.

In April 1940, Roland Craig died. His position as chief of the Forest Economics Division was filled by Harrison, who was already making his dynamic presence felt. Harrison traced his forestry career:

> "I was born in Edmonton, which was then in the Northwest Territories, on the 31st of July in 1896. I grew up in Fredericton, N.B., and went to a public school there. Then I had four years at Rothesay Collegiate School and, prior to World War I, I had a year and a half at the University of Alberta in Edmonton. . . . After the war, I went to the University of

New Brunswick in 1920 and emerged with a B.Sc.F. in '24. Two summers I spent at Petawawa Forest Experiment Station as a student assistant. In 1924 I was appointed Forest Assistant at the Pasquia Forest Reserve, east-central Saskatchewan, and I spent two years there. In '26 I was transferred to Winnipeg on assignment to do forest surveys looking towards the establishments of the organization finally known as the Manitoba Paper Company, Pine Falls. After several years on surveys I was assigned to do an inventory of the forests of Manitoba. That took several years, and 1932 and '34 were devoted to a study of the conditions in the sawmill industry of the Prairie Provinces. In 1936 I was transferred to Ottawa to undertake studies in the woods operations of the pulp and paper industry of eastern Canada. At that time I was attached to the Forest . . . Economics Division, whose chief was R.D. Craig. In 1938 I went to the Forest Products Laboratories as Chief of the Economics and Marketing Section. In 1940 I returned to head office in the late spring as Chief of the Economics Division of the Forestry Service following the death of Mr. Craig. . . ."

Harrison has made some penetrating observations on the state of the forest service in 1924:

"There is one angle that a great many people now don't know, but there always was a curious duality in the federal administration, because the Forestry Branch was charged with looking after the forest reserves: everything from timber sales to fire protection. It was also charged with the fire protection over all the forests in the three western provinces from 1912 onward, and this meant, of course, that its expenditures were considerably higher than its revenues. But there was another organization of the Department of the Interior called the Crown Timber Branch or the Crown Timber and Grazing Branch, and they looked after timber disposal on the very large forest areas outside the reserves. They didn't have any professional foresters. Their object in life seemed to be to administer timber permits and collect dues. There was nothing in the way of cutting regulations and it was all extensively a very economical operation. So I used to feel at times that Crown Timber, with its big revenue, was a good deal more popular to the higher-ups of the Department than the forestry, which cost money. . . ."

Harrison related the background of the Manitoba Pulpwood Survey of the late twenties, which was one of the last major activities of the forest service in the western provinces before its administrative role ended:

"Prior to 1926, when I was transferred to Winnipeg, negotiations had been going on for two or three years with a famous railroad man, railroad builder and financier in the West called J.D. McCarthy, with the idea of establishing a pulp mill . . . and eventually the Manitoba Paper Company was formed. It was decided to go ahead, build a mill at Pine Falls and, of course, timber resources had to be found. They were expected to be found east of Lake Winnipeg and along the Winnipeg River, which passes Pine Falls. . . .

"The first job was undertaken when the chief forester of the paper company, Syd Cooper, and I and four or five others, including two or three from the paper company, went by C.N.R. to the crossing of the Whiteshell River just near the Ontario boundary, put our canoes in the water and worked down that country.

"There was something new in this survey. The short time I had been in the office, I discovered that our district office had just been supplied with a couple of steel filing cabinets full of oblique aerial photographs. I had a look at some of these, looked at the key maps, found some of them covered the country we were going to cover in the Whiteshell. There were no detailed maps, of course. Anything like the modern topographic maps didn't exist. But it was very obvious on inspecting these that, because of old fire records and so on, . . . the timber existed in clumps and patches and that you could spend months with the ordinary strip survey travelling through totally useless country. With the photographs in your hands, if you could recognize the lakes and rivers, and these features were very frequently very plain . . . you could guide yourself to where the timber was. So, before our survey was starting out . . . I went to Colonel Stevenson and said: 'There are about three or four hundred of these photographs; they'd be absolutely invaluable in the field, because we're only allowed a month to cover a large stretch of country.'

"He was much perturbed and he said: 'Harrison, you must be out of your mind. Do you realize that these things are worth 25 cents apiece and there are a hundred in the flight?' And I said: 'Yes, I realize that, but they'd be worth $50 apiece sometimes in the field. They'd save a whole survey party two days here and four days there.' And, furthermore, I had taken the precaution of discovering a stout steel box that would hold these precious things travelling in a canoe. It was a pig on the portages, but it was worth its weight in gold, and it may be that that was the first time that aerial photographs were ever taken into the field as the basis for a forest survey. . . . Anyway, these things were a tremendous success. . . .

"During the following winter, plans were made for the largest forest survey that was ever carried out in Canada by one organization. There were to be 10 ten-man parties, each headed by a forester of what was then the Dominion Forest Service, and with a second-in-command representing a paper company, and staffed by forestry graduates, some students, and each party, of course, with a cook who could do a little handyman work, a necessary compass man, and three canoes — 17-foot Chestnut Prospectors, which proved perfect for the purpose.

"This was a large-scale use of air photos; all parties had them, and they had very rough maps, but nevertheless very valuable ones, prepared in a single winter by the Topographical Survey people. This was before the forestry people got into doing their own mapping. The wonderful thing about the air photos was that they were obliques. With verticals, none of us had any experience, and we couldn't have done a thing. With the obliques, we could look at them. They were in perspective, so you very quickly got that you could recognize the shapes of lakes, where points were, . . . and even occasionally correct errors on the maps we were supplied with. So that was a radical change in the forestry survey maps.

"Well, this was all done so that the paper mill could be supplied, and the area was set aside as a selection area under Forestry Branch cutting regulations. For the next two years suitable patches of timber were selected and allotted to the paper company to supply its future needs. . . . The timber was all in patches and, before we had the air photos, it was thought that there were vast amounts of timber inland, but there weren't. It was strictly a patch-quilt affair, and there wasn't enough wood for two mills. . . ."

R.H. Candy had a less charitable view of the survey and the way it was conducted.

"Well, the project started under pressure . . . from the politicians who wanted to develop the forest resources. Based on reports from trappers . . . they came to the conclusion that there were vast areas of timber available for pulp mills. This timber did exist on the banks of the rivers, but, if you went in a distance of about . . . 100 yards, it disappeared into swamp . . . about 90 percent of the area was swamp. The whole thing, as usual, was rushed and no proper preparations were made. Aerial photographs were taken so that we could use them to avoid the blank areas, but these photographs very rarely reached the parties. Consequently the survey parties concerned used a strip method of measuring the trees. The men had to travel many, many miles through sheer muskeg, in many cases causing injury and . . . exhaustion to find nothing.

"The equipment that we got was extremely poor. This is a country with many rapids, and men without experience were put on without any training and there were some that were drowned, but particularly bad were the aeroplanes which were supposed to . . . pick us up and show us over the area. . . . In one instance an aeroplane which proved to be completely unfit for flying collapsed and crashed and all four members of the crew were killed. I myself went up in an aeroplane which nearly frightened me to death. All I had to sit on was a bucket and I nearly froze. . . . I really was far too concerned with my own personal safety to see what was below me other than it was mostly muskeg. . . . I got the impression that they got all the cheapest material they could in a terrific rush to . . . get this survey completed due to the pressure from the local politicians in Manitoba."

Life in the Manitoba bush also had a lighter side:

"The boat which brought in supplies had very thin boards and the first time it got into rough seas it had to head for shore because it was rapidly sinking. Consequently, our party was completely cut off supplies, and we had to go and live with an Indian band, where we ate nothing but the dried moose meat . . . in exchange for what flour we had. Our main entertainment was dancing with the Indians in which they all used us as the girls and we were swung around and got some considerable fun out of it. The glorious end was that we were picked up by a fishboat and taken home."

# 17. Silviculture Research and the Depression

Although investigations in forest culture had steadily expanded since 1917, the long-range plans required for these studies, by their very nature, make them less spectacular subjects for scientific papers and general interest than, for instance, Seely's achievements in the use of aerial photography. However, the opportunity for expansion in silviculture research occurred in 1933 when the federal government decided to increase the number of forest experiment stations, providing employment for many Canadians left jobless by the Depression.

Finlayson, in his 1933–34 annual report, outlined explicitly the plan for expansion, the essential function of silviculture, and the significance of the new development for the future of silviculture research. He explained that forestry experimental areas constituted field laboratories and provided facilities for detailed scientific investigation of the rates and conditions of growth of Canadian tree species and forest types. This type of data was essential for the management of timberlands on a sustained-yield basis.

Through Finlayson's efforts, experimental areas were established in New Brunswick, Quebec, and Manitoba and negotiations were initiated in British Columbia for the acquisition of an area of approximately 104 km$^2$ (40 square miles) on East Thurlow Island, but the discussions broke down. Harrison recalled:

> "There were discussions between the Director of the Forestry Branch and the B.C. authorities and it was indicated that B.C. was prepared to make available Thurlow Island for Forestry Branch use for research purposes, but our Director felt it necessary to insist that certain timber sales which had been made on the island should be cancelled. The B.C. authorities weren't prepared to do any such thing; so the whole matter was dropped."

Unfortunately, this disagreement developed into a serious personality clash between two strong-minded men, Finlayson and British Columbia's chief forester, Orchard. The feud was dormant during Cameron's relatively brief regime but surfaced again when D.A. Macdonald succeeded him. Thus, except for the forest products laboratory, the federal forestry service was denied an active research role in what had become Canada's most important forestry area, because of personal animosity between these individuals.

However, more successful negotiations were launched to acquire an experimental area in the valley of the Kananaskis River, Alberta; it seemed as though the forest service was going through a form of rebirth, its research responsibilities now extending across the country east of the Rockies. The new stations had to be staffed, and the demand for professional foresters in the Dominion Forest Service increased.

Arthur Bickerstaff recalled the silviculture work at the Petawawa Forest Experiment Station:

> "As resident research officer at Petawawa, I was responsible to the superintendent for a variety of silvicultural studies. The most important time-consuming ones were concerned with a fairly elaborate spacing experiment in red pine plantations. . . .
>
> "Now, the research program was under the general direction of the superintendent, but the Ottawa officer-in-charge was W. (Bill) Robertson. He would come from time to time to look into the various projects and see how they were going. The superintendent was not

responsible to Robertson, but was responsible to the Dominion Forester who, at that time, was D. Roy Cameron. . . . One of the administrative problems the superintendent had . . . was that Robertson and Cameron didn't always see eye to eye, and he would get conflicting instructions. . . .

"For the red pine thinning studies, I wished to open a stand up to a 14-foot spacing and had convinced Robertson that this was a good idea, and he agreed. Then he went back to Ottawa. Three or four days later, there was a letter from Cameron saying, 'Under no circumstances are you to ruin the plantations by doing that.' This arrived just as I was going out to make the thinning, and by mutual agreement with the superintendent, I did not arrive at the office that morning. The plantation was thinned before I got the letter, and I was very sorry about the whole thing. But it was a very successful study."

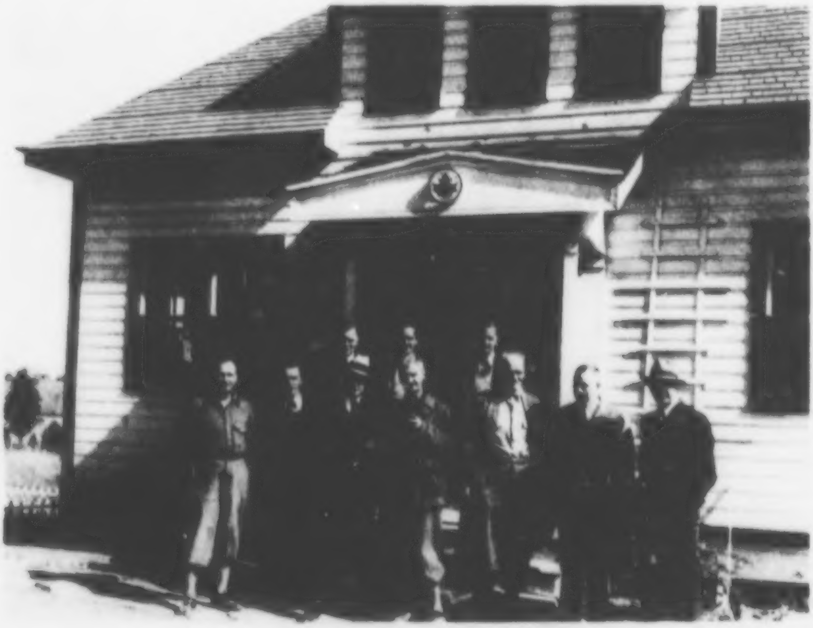


FIGURE 21. Group of foresters and headquarters staff in front of office at Corry Lake, Petawawa Forest Experiment Station, 1935. Back row (*left to right*): R. Pouliotte, supervisor; K.E. Burnett, technician; R.H. Candy, superintendent. Front row (*left to right*): L.G. Francis, clerk; A. Buell, relief camp manager; D.A. Macdonald, assistant Dominion forester; A. Koroleff, CPPA; J.G. Wright, chief of fire research; W.M. Robertson, chief, forest research; Mr. Carson, representative of tractor company.

FIGURE 22. Raising the flag. National Forestry Program, Mount Orford Park, Quebec, 1940. (Forestry Canada)

FIGURE 23. The two-piece orchestra. National Forestry Program, Laurentide National Park, Quebec. (Forestry Canada)

R.H. Candy, superintendent at the Petawawa forestry camp during the Depression, recalled that period vividly:

"I had under my direction about 500 men from what were the relief camps. It was quite different from the National Forestry Program, and my experiences of it were basically that it was tragic in this particular case. Men of all ages, not youth, but anybody that was unemployed could join this relief camp where they got $5 a month and their board and lodging, and they were supposed to build roads. In order that it wasn't done too fast, they weren't given much equipment.

"The intention was, of course, to get roads into the forest so that it was more accessible to fight fire, . . . but basically, no effort at all was really made to encourage the men to work without doing a great deal of hard labor. There was no need to use shovels and wheelbarrows when more modern equipment was available . . . .

"This was a most depressing experience. Men were left in a hopeless position. It was quite noticeable on the day that they got their $5: they used to go to the local pub and get drunk, and yell their names out and say, 'I am Joe so and so' and 'I am Bill so and so', which would sort of tell the world that they were individuals, and that they amounted to something. It was this picture of despair which was most depressing, and certainly not a compliment to a young country like Canada that these conditions should exist."

J.D.B. Harrison described the National Forestry Program:

"That was set up in 1939 to try and get some of the boys who had no chance of employment off the streets, and, of course, the inspiration came from the Civilian Conservation Corps in the United States. But we did it in typical Canadian fashion. In the States, three government departments, led by the Army — that was their main activity. In typical Canadian fashion, it was given to three men to do it here.

"D.A. Macdonald was in charge, and J.R.B. Coleman, later Director of National Parks . . . and I were the three people, and this involved working out a scheme whereby the federal government would put up a number of camps on federal land for experiment stations. . . . The provinces who wished to participate could come and get their equipment and everything else . . . from us, and run somewhat similar camps, but under their own direction.

"A typical camp was to be 27 men, a man in charge, a cook; and these boys who were to be selected with the help of the National Employment Service . . . were to be boys on relief who needed feeding up, had to be healthy. The idea was to put them under a fairly stiff regime, oh, flag raising in the morning, . . . rigid requirements about cleanliness, good food, lots of hard work in the bush, and so forth. It worked so well it was just about impossible to believe. There were three camps in the Jasper area, and when war broke out, the whole personnel went into Edmonton to enlist. The whole lot."

# 18. Forest Protection and the Galatea Fire

Until the transfer of resources, fighting forest fires was the forest service's main activity: it took precedence over all other activities in the field when the crises developed, as they invariably did each summer. Yet, in the thirties, the service, which was no longer responsible for forest protection, except in very limited federal areas, developed forest protection techniques that far surpassed its achievements during the years when this was its main responsibility. When the service was forced into research, rather than administration, it made its greatest advances precisely in what had been its major concern for the previous 30 years: forest protection.

The problem had not diminished with time. The 1933–34 annual report of the director of forestry showed that more than 57 000 forest fires resulting in a loss of more than $52 million had occurred between 1924 and 1933. More than 85% of these fires were attributed to human agencies. Canadian forest services, forest industries, and the general public were deeply concerned with this major problem. Thus in the early thirties the forestry service assumed the leading role in the forest fire protection field.

Between 1930 and 1932, J.G. Wright evolved the basic principles of the Wright system of fire-hazard measurement destined to win wide acceptance and acclaim. A description of this method was published in 1932, and the first fire-hazard tables for mixed red and white pine forests were published in 1933. In the same year, his tables were adopted by the Ottawa River Forest Protection Association. The tables indicated the hazard accurately by comparing the time of occurrence and behavior of many fires that occurred over 5 years with the degree of hazard calculated from the tables for each day of the period studied.

Analyses of data collected in previous years and several improvements in technique were made. A circular slide-rule was developed that embodied the data contained in the fire-hazard tables. It facilitated and accelerated the calculation of the daily degree of fire hazard. The Wright evaporimeter and the fire-test screen were also developed. Desk work at this time involved finding suitable methods of multiple correlation analysis for determining the complex relations between fuel moisture content and the weather elements.

Fire-hazard investigations in cutover pulpwood forest regions started in 1935 at Valcartier Forest Experiment Station and included a special examination of the technique of inflammability studies in logging slash. A province-wide network of weather stations was installed that would use the Wright fire-hazard measurement system for the year. Close liaison was maintained during the entire period with the Quebec Forest Service.

A fire-hazard research station was established in cooperation with the New Brunswick Forest Service near Fredericton in 1937. The installation of a complete system of forest-weather stations in New Brunswick was begun at the same time. Fire-hazard studies in cutover and burned areas were conducted in the northern part of the province assisted by the pulp and paper industry. Because of wartime reduction in staff, the field work in New Brunswick was discontinued in 1940, but enough data had been obtained to produce fire-hazard tables for the region.

In 1938 the fire-hazard tables were revised and expanded to cover an increased range of forest types. Local forecasting of weather and fire hazard for the use of remotely situated forest officers not equipped to receive regular forecasts was developed after 1937. The Wright system was introduced in the western national parks in 1939. Fire-hazard studies were started the same year at Kananaskis Forest Experiment Station, but after 1941 field work was suspended because of war restrictions.

Fire-hazard research was the most important, but not the only, activity undertaken by the Forest Protection Division during the thirties. In 1934 Wright began a study of fire-retardant chemicals for use in forest fire suppression. He later experimented with chemicals to inhibit the growth of vegetation on fireguards.

In 1936 two advisory fire research groups were formed: the Subcommittee on Forest Fire Research, under the auspices of the National Research Council, and the Fire Research Committee of the Canadian Society of Forest Engineers. Members of the Forest Protection Division held office in both bodies and contributed substantially towards their activities.

Among the more important projects undertaken in cooperation with the National Research Council was the development of specifications and performance-testing procedures for portable fire pumps, hoses, and nozzles. Wright, together with D.T. Hewson of the National Research Council, developed a simple and fast method of assessing the performance of fire pumps in the field during 1938. They also prepared specifications for an ideal portable forestry pump, which led to the production of a pumping unit well known on the commercial market. Their study of hose characteristics resulted in the Canadian Government Purchasing Standards Committee's specifications for forestry-type linen hose, which became generally accepted as standard in Canada.

One aspect of forest fire research, however, deserves further explanation. It is controlled burning, that is, deliberately setting forest fires to study their behavior. J.G. Wright elaborated:

> "My first contact with that was during the period 1925 to '29, when I was trying to get permission to start my forest fire research program. Now, there had been no actual fires, no statistical material to work with on how fires burned under different weather conditions. My method required the setting of experimental fires, and I suppose I have started, or arranged the starting through subordinates, of more experimental forest fires, have set more forest fires . . . than any other human being. This was not looked upon with favor by the then Director of Forestry, E.H. Finlayson, and was one of the reasons, I think, why he refused to allow me to undertake forest fire research. . . .
>
> "Forest fires under control can be used advantageously to get rid of undesirable waste material, to introduce a new area to replanting that is infested with some other varieties that are not desirable. Any of these things can be done under control; the whole thing is a matter of control, and the control is hinged on our fire-hazard index. A lot of these things can be done now . . . that couldn't have been done years ago, because they didn't know when it was safe to burn."

Herbert W. Beall, who would make major contributions in other fields of forestry during his career in the postwar years, was Wright's closest collaborator in the thirties. In a wide-ranging discussion of fire fighting techniques, Beall talked about working on the fire research stations in New Brunswick during the thirties:

> "We undertook to set up a network of forest weather stations, and to train observers to read weather instruments and to work out daily fire danger indexes from the tables which were provided; finally, to follow these up by checking the weekly returns sent in by the

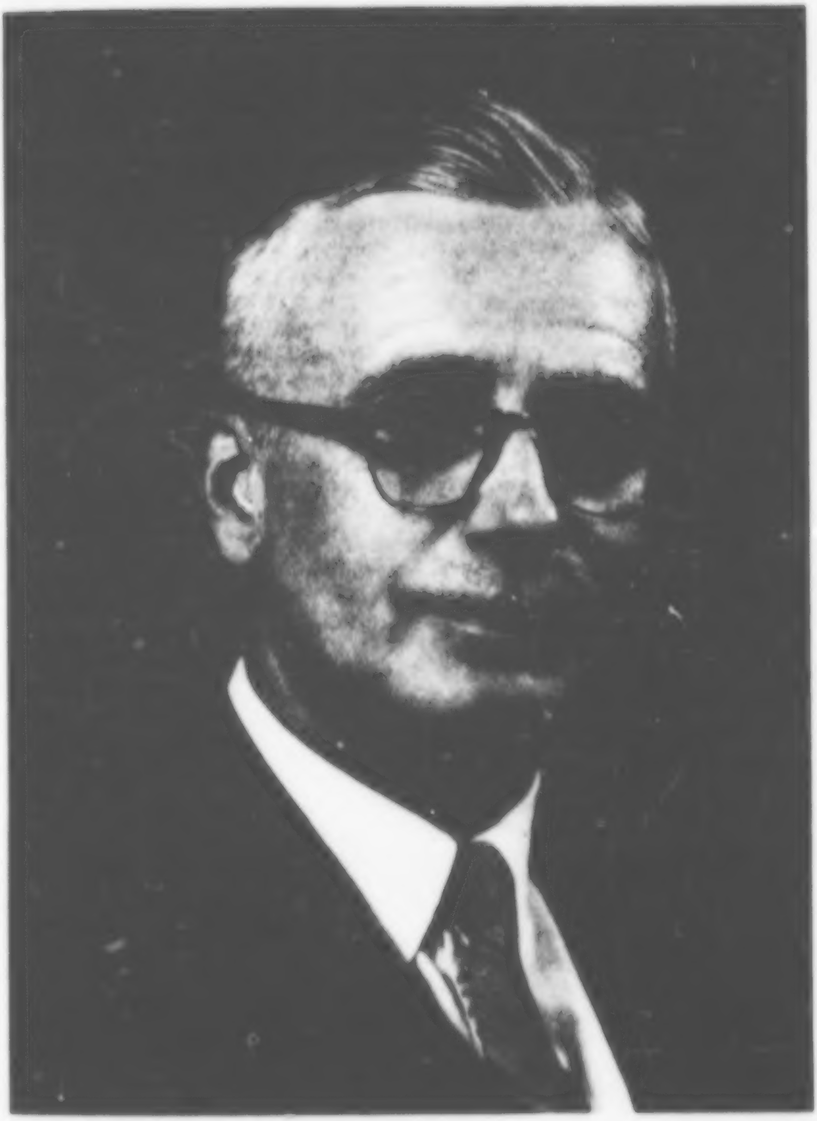


FIGURE 24. Herbert W. Beall. (Forestry Canada)

observers, collecting them and seeing that the whole thing was running smoothly.

"I am quite sure that if we had not taken this action, their fire-hazard tables would have laid unused, very largely because people simply didn't understand them, and didn't take the initiative in getting them going. But if you had somebody who did understand them, to get them started, get them organized, then they became sold themselves. This was my experience.

"Some of the observers that we had could scarcely read or write, you know, and they were so terrified when they saw these large pages of tables that they pretty nearly started climbing the nearest tree. They didn't think they could handle it at all, but with a little care and kidding them along a bit, as soon as they found that they could, in fact, take the readings and work out the danger index, they were so pleased with themselves that it became a point of pride with them to be able to do it."

About his own contribution to forest protection research in the thirties, Beall said:

"Perhaps the most useful adaption that I introduced into the Wright system was in working out or modifying these graphic methods of correlation analysis to enable us to handle the complex relationships between the weather elements and fuel moisture. . . . In those days it was pretty difficult to handle by the old multiple regression equations and a hand-operated calculator. By using graphic methods we were able to short-circuit and cut down the work required in working out correlations. . . .

"I think perhaps, too, I was the one who brought out what is still called the 'drought index' in fire danger rating. The earlier tables were based on measuring the moisture in light surface fuels, pine needles, litter, duff, this sort of thing, dead grass. But an element that contributes to the difficulty of suppressing fires is the amount of moisture in the larger chunks of wood — the logs, dead windfalls, and so on — and the humus underneath the surface litter, which is largely decomposed, which dries very slowly but, if it does dry out, it's extremely difficult to control a fire in. So we invented a thing called the 'drought index' to take care of these heavy fuels, which take a long time to dry out, as well as the surface fuels. . . ."

Fighting a Rocky Mountain forest fire in the thirties is described in Harry Holman's report on the Galatea fire, near Kananaskis, in August 1936:

"On Tuesday evening, August 4, about 6.00 p.m., Messers Holman and McLenahan were on their way to Evans-Thomas Creek Fire with food and blankets for the patrolmen, when they noticed smoke coming from near the summit of Mt. Galatea. . . . The fire was reported to Provincial Ranger Griffiths . . . who immediately proceeded on saddle horse to investigate. The fire was also reported to Ranger Campbell at Canmore by telephone.

"Griffiths stated that the fire was high up on Mt. Galatea on a spur between the two southerly forks. It was at timberline in an inaccessible place, surrounded by rock walls on all sides, although there was a timbered slope in the gulch directly below. He considered that it might burn itself out during the night but also said that embers might fall into the gulch and fire the lower pocket. Owing to its location he did not consider it serious nor did it appear serious to anyone who saw it in its initial stages. . . .

"Ranger Campbell arrived next morning (Wednesday) to look the situation over and, urged by our staff to put a crew in, and promised what he needed in the way of equipment . . . he decided to do so and returned to Canmore to arrange it. A crew of twenty-five men arrived that evening and established at Boundary Cabin until horses could be secured to move them into Galatea Creek, the river being impossible to wade at that point.

"The pack train to move the crew did not arrive until Friday morning so Thursday was spent by the crew rebuilding a broken bridge near Mile 14 and other road work between there and the mouth of Galatea Creek at Mile 18. When five horses arrived Friday preparations were at once made to move ten men cross the river. While they were on their way up they were intercepted by Campbell, who had discovered the fire to have spread into the valley of the main river at Mile 21. They were taken there instead, and another ten or twelve men moved up to Mile 18, ready to cross to Galatea Creek early Saturday morning.

"Up to this stage the fire had been purely a Provincial Forest Service concern, as it was at least two miles from our nearest boundary. Nevertheless the strong southwest winds were continuing to blow every afternoon and it was realized that only a slight shift in the direction of the wind, or an increase in its intensity, would very quickly put the fire where it would very definitely be our concern. Ranger Campbell could only devote part time to the fire owing to the necessity of getting supplies to his larger fire at Kananaskis Lakes. It was therefore arranged with him that we should supervise his crew until such time as he could devote full time to them. Accordingly, Holman took over the Mile 21 crew of ten men on Friday night and McLenahan the Mile 18 crew on Saturday.

"Holman spent Friday night at Mile 21, making preparations to prevent the fire crossing to the east bank of the river at that point. On Saturday morning the fire burned down to the west bank of the river and this crew was fully occupied until about 3.00 p.m. putting out spot fires. At 3.00 p.m. word was received that the fire had crossed the river at Mile 18½. The line which this crew had been holding was immediately abandoned and they were rushed to Mile 18.

"The fire at Mile 18 was fought all Saturday afternoon but was finally extinguished about 1.00 a.m. Sunday morning. Another was discovered at 5.00 a.m. which was extinguished at 10.00 a.m. At 3.00 p.m. the fire was all on the west side of the river between about Mile 17 and 18½. Men were strung out between these points on the east side of the river, putting out spot fires with water bags. There were 24 of them altogether: 12 Dominion and 12 Provincial. Twelve Provincial men were resting at Boundary Cabin.

"Shortly after 3.00 p.m. the strong southwest wind suddenly increased to gale force and the situation all at once became impossible. Embers were carried high in the air and deposited more than a mile ahead of the main fire. In the words of one of the men, "the whole country exploded" and, almost literally, that is what happened. In an incredibly short space of time, an hour or perhaps half an hour, the whole valley from Mile 18 to Mile 12 was burning furiously in a hundred or more different places, and within this area were about 40 men, 30 horses, and about $25,000 worth of equipment, including the two tractors with attachments, one dump truck and almost all our firefighting equipment.

"One can give no connected account of what happened during the next two hours. McLenahan's crew of 24 men were together at 3.30 p.m. hastening down river. He experienced great difficulty in keeping them from getting panicky, and placed Mr. Harrison at the front, two reliable men in the middle, and himself brought up the rear. Near Evans-Thomas Creek they were suddenly enveloped in a sheet of flame from a crown fire. Five

FIGURE 25. Forester Harry Holman, 1920. (Forestry Canada)

men with Harrison ran ahead. Four men ran shrieking into the woods, downwind ahead of the fire, and 14 stayed together behind the flame. McLenahan managed to overtake two of the four who had run into the woods and, with 16 all told, go down on the river bars, where they were comparatively safe for the time being.

"Harrison, with his five men, got through to Wasootch Camp about 6.00 p.m. McLenahan, with his 16, arrived about 8.00 p.m. Two men were missing and, when last seen, were running ahead of the fires. These two men, very luckily, ran into a beaver dam or small slough, where they spent the night. . . .

"Between 3.30 p.m. and 4.00 p.m. cyclonic winds began to appear in Ribbon Creek Valley, just across the river from Boundary Cabin. At 4.00 p.m. a particularly violent one blew for about ten minutes, picking up flaming embers, branches, and even fair-sized trees. The column of debris must have reached over 10,000 feet in the air. It moved slowly towards Mt. Wind and finally broke up on the easterly spur, scattering fire over the whole valley as far as Mile 10. When this stretch started to go, Boundary Cabin was evacuated as rapidly as possible, and all men and equipment there moved to Wasootch Camp, and later, to headquarters, as Wasootch Camp was not considered safe that evening. With the exception of the two missing men, everyone, thoroughly exhausted, spent the night at headquarters.

"Had the wind continued blowing on Monday from the same direction and with the same intensity as on Sunday, the fire would most certainly not have stopped south of the Bow River. Fortunately the wind did change. During the night there was scarcely a breath of wind, and a light northerly breeze came up at daybreak. . . ."

# 19. Forest Products Research

The story of forest products research in the thirties reflects the fortunes of the forestry service itself, modified on one hand by the individual problems of the three laboratories and, on the other, by the undoubted support accorded these laboratories by the forest industries.

The move of the Montreal laboratories to Ottawa was undoubtedly traumatic. That and the splitting-off of the Pulp and Paper Research Division and its return to Montreal to disappear into the Pulp and Paper Research Institute were both reflected in the annual reports of the period.

Not until 1930 did the forest products laboratories seem to be coming out from under the cloud that was about to engulf the service itself. This was illustrated by the proliferation of divisions that took place within the Ottawa laboratory. The divisions of wood preservation, timber mechanics, timber physics, timber pathology, wood utilisation, lumber seasoning, markets and exhibits, and office administration were established.

The 1939 report of the Dominion forester describes the extensive activities that developed within the forest products laboratories during the thirties. The report was not signed, so low had the service dropped in status within the government hierarchy after it disappeared into the Department of Mines and Resources in 1936. Nevertheless, the report on the forest products laboratories occupied more than half of the Dominion forester's report and possibly represented more than half of the political muscle that the service could command; for the laboratories were unquestionably well regarded by the forest industries, which, in turn, had gained in strength and importance in the country's economy during the decade.

D. Roy Cameron, who was then Dominion forester, pointed out in his report on the forest products laboratories that the processing of timber into lumber, pulp, paper, rayon, cellophane, wood distillation products, veneers, plywood, furniture, planning-mill products, and a great assortment of minor products and parts involved many highly complicated mechanical and chemical processes. The forest products laboratories functioned as a central organization in Canada seeking new ideas and carrying out investigations to assist industry in improving existing manufacturing practices and in devising new uses for wood. A special feature of their work, emphasized increasingly each year, was the curtailment of waste in the woods and the mills. This was particularly important because Canada was a large exporter of wood products and therefore had to maintain a competitive position in world markets. The laboratories collaborated with industrial associations interested in pulp, lumber, and other wood products; with provincial governments; with other departments of the Dominion government; and with Canadian trade commissioners and timber commissioners in other countries. Most of the problems that concerned the laboratories arose from the needs of the industry encountered in domestic and export markets.

The main functions of the laboratories were carried out in Ottawa; all phases of wood utilization were dealt with, except those relating directly to the manufacture of pulp, paper, and related products. These were dealt with in the Pulp and Paper Division in Montreal, which worked closely with the Pulp and Paper Association and McGill University. A branch laboratory was maintained at Vancouver on the University of British Columbia campus to deal with problems pertaining to British Columbia timber that could be coped with most effectively on a local basis.

The Pulp and Paper Division in Montreal listed 8 major projects undertaken in 1939, and in Vancouver the 2 divisions of timber mechanics and timber products listed between them 15 projects, which included the pioneer work in kiln-drying that gave Dr. J.H. Jenkins an international reputation in that field. In Ottawa, the 8 divisions were involved in 44 major projects and numerous smaller ones. These included the monumental work of Dr. C. Greaves in wood preservation and Dr. Clara Fritz in timber pathology, work that would save millions of dollars for the railways and for the telephone and power companies.

Dr. C. Greaves joined the forest products laboratories in Montreal in 1924 and was chief of wood preservation at Ottawa when he retired in 1956. His first appointment was as a wood chemist, and he recalled the work being done at that time:

"The first job I worked on was to determine the amount of zinc chloride, which was a preservative used at that time; my research was carried out to determine how fast it leached out of the wood. Because that's the chief cause of the loss of a preservative — the leaching out by rain or snow, melted snow. And I carried out this test by taking a certain number of blocks of wood and treating them with zinc chloride and then leaching them in water for

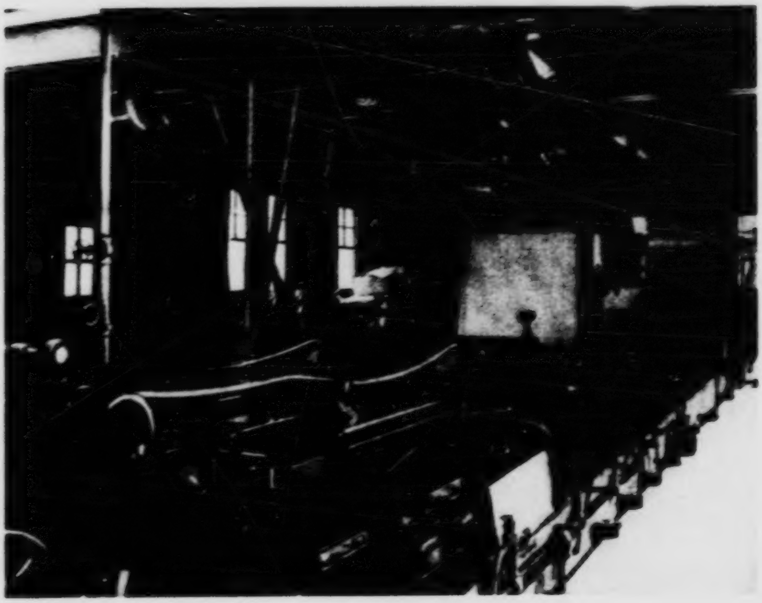


FIGURE 26. Forest Products Laboratories of Canada, experimental paper machine. (Forestry Canada)

various periods, and determining the amount of zinc that was left in the wood after the leaching. . . . In this way we were able to discover that considerable zinc remained in the wood; it didn't leach out very readily. It was quite a lasting preservative.

"I consider that the most important thing that the Wood Preservation Division did for the industry was to educate users in the importance of treated wood over untreated wood. Very few people realize that wood can be treated so as to make its useful life very much longer, and that such treatment is accompanied by a great saving in money. So I think that the most important thing we did, besides carrying out one or two special treatments to show how under Canadian conditions treated wood lasted, . . . was to demonstrate the knowledge of wood preservation, especially to big companies like the C.P.R. and C.N.R. and Bell Telephone, that use considerable quantities of wood outside. They came to us, especially at first, and we indicated to them what wood preservatives there were and how they should be used and how much they improved the life of the wood. . . ."

Possibly the most notable scientist at both the Montreal and the Ottawa forest products laboratories was the remarkable Dr. Clara Fritz, who joined the forest products laboratories in Montreal as a timber pathologist in 1925 and retired as chief of timber pathology at the Ottawa forest products laboratories in 1954. She recalled those early days:

"The laboratory was moved to Ottawa in 1927. . . . We were housed in a rented building near the museum. The man who came down from Ottawa to arrange for our departure told us before leaving Montreal that it was not necessary to be too particular about arranging the space that was allotted to us in Ottawa, because it was going to be a purely temporary building. . . . However, I spent 27 years in Ottawa and I was still in the same building at the end of my career.

"The first project I started on was red stain in jack pine. Jack pine grows extensively throughout Canada and it's used for rough timber, particularly for railway ties. The tree is subject to a disease caused by a fungus known as '*Fomes pini*.' In its early stages, the fungus causes stain in heartwood. It had been established by the . . . department of Timber Mechanics that the red-stained wood was not reduced in strength, but as the fungus develops in the wood, it produces a white pocket rot which absolutely destroys the tissue.

"It was the railways who were interested in knowing whether the disease, the fungus, would continue to develop in timber in service. So, very soon, I went to a mill in northern Ontario, in the vicinity of Sudbury and I . . . selected, as the ties passed through the mill . . . more than 400 ties which contained this disease in various stages, as nearly as possible without any pocket rot. Four hundred were shipped to the laboratory and 200 of them were creosoted. The others were unprotected. Cultures were made under antiseptic conditions at the treating plant in Delson, Quebec, and by this I mean borings were taken . . . to bring up chips on sterilized paper. The chips were then transferred to sterile bottles and brought to the laboratory at McGill University, where we had been offered facilities for work.

"It was established that the fungus was viable in all these ties. Then we moved to Ottawa and the ties were brought to the laboratory there. . . . It was established whether the fungus had continued to develop. The untreated ties were, of course, attacked by many secondary organisms, which caused more rapid decay. In the treated ties, very little secondary infection was found. It was found that the fungus, the *Fomes pini*, did not develop to cause pocket rot, but the fungus was not killed by the creosote treatment. Even at the end of the experiment, there was still viable fungus *Fomes pini* in a few of the ties.

"As a result of the experiment, the railway companies were able to accept much of the wood which previously would have been discarded. The red-stained wood without any pocket rot was subsequently used and it was said that it led to a savings of up to $2 million a year."

Dr. Fritz was Canada's first female timber pathologist:

"I was the first women qualified, and, as a matter of fact, when I left the University of

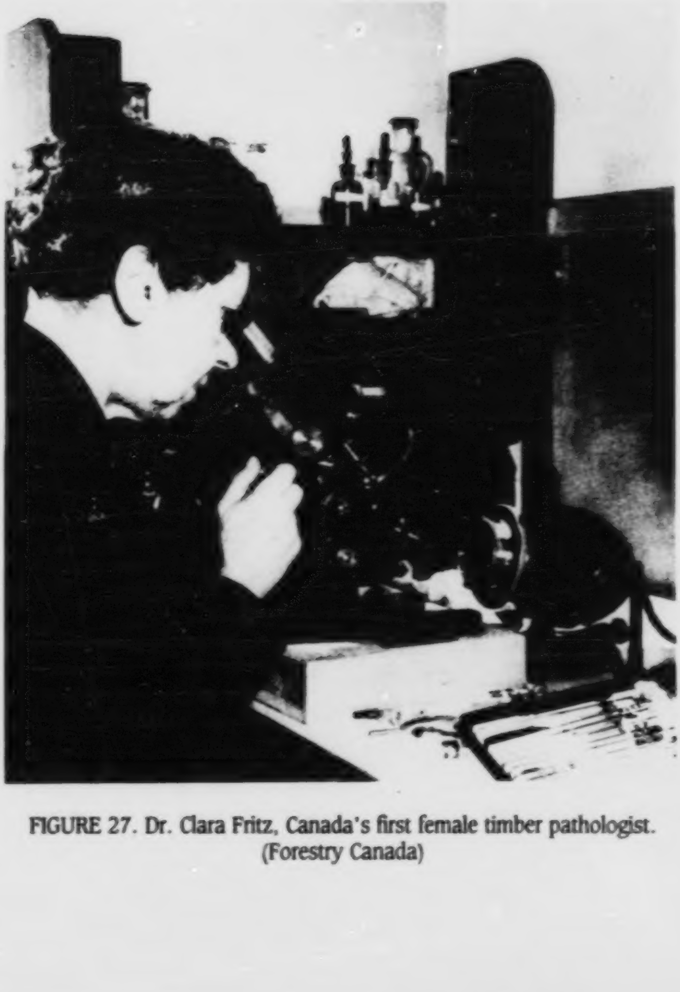


FIGURE 27. Dr. Clara Fritz, Canada's first female timber pathologist. (Forestry Canada)

Toronto . . . I was the only person in Canada, man or woman, able to qualify to carry on this type of work. My difficulties were not very great, on the whole, but I had some interesting experiences. For example, I had a plot in Petawawa at the forest reserve, where I was testing the resistance to decay of different types of timber, and there was no place where they could put up a woman in those days. So I had to go to Chalk River.

"I had a rather amusing experience in Ottawa. The Pulp and Paper Institute had monthly meetings, at which they had speakers who would speak on any projects in which they were interested, and one request came on the question of slime — the development of slime in pulp and paper mills. Mr. McElhanney, who was the superintendent of the laboratory, asked me if there was someone who would speak and I said, 'Yes. I would be very glad to give a short address on the subject.'

"We had been carrying out some tests on the development of slime, and I was asked to be at the Chateau Laurier on a certain evening when they were having a dinner. However, I was not invited to the dinner. I was asked to sit out in 'Peacock Alley' while the members of the society were dining in state, in one of their small private rooms. Then, at the conclusion of their dinner, somebody came out and asked me to come in to address the meeting. I wasn't even asked to have a cup of coffee. However, at the conclusion, it seemed that the address had been interesting and later I heard that it was one of the best addresses they had had during the season. So, times have changed very considerably.

"During the years that I was at the Forest Products Laboratories, I built up a collection of cultures of wood-rotting fungi. The cultures were made by taking small fragments of decayed material and imbedding them in a jelly. After a few days, if the fungus is viable, a characteristic growth would appear on the surface of the jelly. When I was at the University of Toronto studying for my doctorate, I had found that each fungus had a characteristic growth, so that if we compared one culture to another, we could establish its identity, if we had a culture from a fruit body, to which it would correspond."

Asked what she considered her most important achievement, Dr. Fritz replied:

"Well, I think my project on red stain in jack pine was probably the most valuable, in that it made so much more timber available which otherwise would have been discarded. I think that the most satisfying thing, as far as I personally am concerned, in my work with the decay of timber was the establishing of the various organisms which cause decay, and the fact of being able to recognize them in culture. Their characteristics are very distinct, and it was a satisfaction to be able to identify them and to establish a collection which was fairly representative of the material that we were getting from the field."

The work of the forest products laboratory also involved the study of wood anatomy and the definition of characteristics of wood. While studies of this type were basic to the determination of strength properties, they also proved useful in other situations. Dr. Joe Hale, a long-time service employee and Canada's outstanding wood anatomist, recalled the role he played in the trial of some Nova Scotia rumrunners:

". . . The Mounties brought some pieces of a pine crate which housed . . . I believe, a five-gallon container of alcohol, which they had seized as part of a shipment off Nova Scotia. The case hinged on proving that the . . . crate matched a piece of wood that had split off from the crate, the piece of wood being found in the hold of a schooner. A number of crates with missing pieces of wood and with other pieces found in the hold of the schooner were brought to the labs in Ottawa and this was . . . my first experience with the Mounties and I was inclined to think that I hated to be instrumental in convicting the innocent peasantry fishermen of Nova Scotia. However, we found that these pieces of crate unmistakably matched the material that the Mounties had seized. . . . So I went down to testify, and I may say that I was greatly impressed with the work the Mounties were doing . . . ."

He recalled one particular aspect of the proceedings:

"Each defendant had a rather high-powered lawyer defending them, a couple of QCs at least, and one of them was so brutal with the other Crown witnesses that . . . I lost any scruples that I had had about being on the side of the cops. But when it came to cross examining me as an expert witness, the lawyer was . . . very complimentary: he was my pal . . . he asked about my qualifications, which the Crown had established, and he was evidently impressed by them. And so he asked me if I was familiar with foreign literature on the subject of wood and I said we had a library that had lots of foreign literature on wood. So he then inquired was I familiar with the books on wood by . . . Curtis and Rogers. I said . . . we had books by those people in our library, but asked which ones did he have in mind. And he said . . . 'you have read these books have you?' Well they are text books; the one by Rogers is pretty thick; it's not one that you read; I was thinking of Julia Ellen Rogers' *Tree Book of North America* . . . and I explained it wasn't a book on wood but it was one to which we sometimes referred . . . and for the book by Curtis, well, I just knew it was there.

"I could see that the Crown attorney was getting frantic but as . . . me and the lawyer were getting along fine, I couldn't see any reason for it. And then the man let go the elastic and he said, 'Would it surprise you to know that these books are entirely figments of my imagination. Rogers is the name of one of my partners; Curtis is the name of the other.' And, of course, the court, including the jury, got a big laugh out of that.

"In the fall . . . I had to go down . . . to testify once more and . . . I had brought down the books to the Crown prosecutor in case he didn't believe that the books existed. . . . The lawyer started his cross examination by asking if I remembered the earlier trial when I professed familiarity with certain books. I played it dumb. I could see the Crown prosecutor tearing at the fastenings with which the books were done up. They were in brown paper . . .; so I just said, 'Books'? And he said, 'Oh, yes, yes, books with which you professed familiarity but which in fact did not exist.' And by that time the Crown prosecutor had . . . the brown paper torn off and he flung them down in front of the lawyer and said: 'Yes, there they are: there are the books that don't exist.' And he stopped his cross examination on that particular point and retired. Anyway, the poor guys got sent up . . . on the evidence, and I sympathized with them. . . ."

Dr. J.H. Jenkins recalled the early days of the Vancouver laboratory:

"At that time, the Forest Products Laboratory was located in the machine shop at the University of British Columbia. The University of British Columbia was located in a building of the Vancouver General Hospital and the applied science was in what was called 'the

FIGURE 28. Dr. J.H. Jenkins. (Forestry Canada)

shacks,' which had been put up to give machine shop courses to returned soldiers. . . .

"The Vancouver laboratory . . . was established primarily as a timber-testing station. It had one section only, and that was testing the strength of Douglas-fir, of British Columbia species. Practically no information was available on the strength of timber, and as the timber in British Columbia was of a size and type that would make it suitable for structural purposes, it was essential that there be accurate information on its strength. . . .

". . . I started to specialize in kiln-drying, the seasoning of lumber and visiting mills.

The first thing I did was to make a study in cooperation with the grading inspector of the B.C. Lumber Manufacturers Association, and we carried out these studies at the mill and would find out how much they were actually losing by faulty seasoning. We would check the number into the kiln, and then when it was going through the machines . . . we would find out what the loss was.

"I had a follow-up on these degrade studies, which were published, and a report sent to each of the mills participating. In order to improve and reduce these losses, which we were able to show amounted to about $1 million for the mills, we started up dry-kiln courses, which are still being carried out by the Vancouver laboratory. . . . They dealt with utilization in general and then dealt with kiln-drying, showing how their procedures could be improved. They gradually attracted enough interest and prestige that the mills were sending their own operators and were paying their salaries for the two weeks. So, eventually, before I left, all of the active operators in the dry kilns of British Columbia had been through our course.

"Well, this continued and we gradually expanded our work until it was recognized as a utilization section, and I got two assistants. . . . Then, after much persuasion, we finally got a grant to construct an experimental dry kiln and, there again, we were doing it on a shoestring. We got some of the firms like Moore Dry Kiln Company to donate their control instruments and we had to put in our own boiler, because the university couldn't supply the steam that we required for a 24-hour-a-day basis. So we put in our own boiler, which meant that we had to hire an engineer, and that was all out of expense.

"Then I worked out a scheme whereby we'd borrow the green lumber from a mill. We would pay the transportation and the lumber would come out to us. They would loan it to us and we would dry it and return it on the understanding that if any of our experiments went very wrong, they would absorb the loss. We continued that way until we published a bulletin which was well received, called *Kiln-drying of British Columbia lumber*. . . .

"In the lab, when the depression came, we could always console ourselves that, at least, we did have a job, until one day, about ten o'clock in the morning, a wire came from Ottawa saying, 'Advise Alexander and other members of the staff that their services will be terminated at noon of today.' This wire had the effect of cutting out completely the Timber Mechanics Division. After noon of that day the staff of the Vancouver laboratory consisted of the superintendent, Brown; his special assistant, Perry; and the utilization division, which was myself, Fred Guernsey and Herbert Eades; and the one secretary, Miss Harris. Later on, through the efforts of the industry, the dismissal of the Timber Mechanics section was cancelled. After they had gone on retirement leave, they all came back."

In light of these conditions, the achievements of the forest products laboratories in the thirties are even more impressive.

# 20. Assessing the Depression Years

The thirties opened gloomily for the federal forestry service; its survival was even doubtful. According to Cameron, Prime Minister Bennett at one point considered eliminating the service altogether, but "other counsel prevailed." Stripped of its administrative role, its staff halved even before the Depression, it suffered further reductions in the early thirties both in staff and in budget, from which not even essential research programs were protected. The blow to morale was deep and long-lasting, but the service survived and even grew stronger during the rest of the decade. It seemed to have somehow acquired that quality of survival and regeneration that the forests themselves often manifest after the ravages of insect, disease, fire, and man.

It is understandable to wonder why the handwriting on the wall, which had been clear since 1926, was not deciphered more quickly by Finlayson; why he did not plunge more deeply into research, which clearly had been Campbell's goal and for which the demise of the Commission of Conservation had provided a golden opportunity at a time when the prestige of the service was increasing. It seems clear, however, from the testimony of people close to Finlayson who loved and admired him for his fine organizational ability and his fighting spirit, that he was completely out of sympathy with forest research. To him, forestry was summed up in administration. This trained forester actually repudiated the philosophy of the two nonforesters, Stewart and Campbell, who had preceded him. So, too, the tentative steps that were taken into research in the late twenties were, in some instances, against the inclinations and over the opposition of the director. If Stewart and Campbell had been the right men at the right time, as their record so clearly shows, Finlayson, on his record, was the wrong man at the wrong time. A more research-oriented director, with more political muscle, would have survived the blow that destroyed Finlayson.

During Finlayson's later regime, interspersed with disappearances and illnesses, D. Roy Cameron encouraged research and, when he replaced Finlayson, research moved into high gear. Cameron had political finesse, too, and his friendly relationship with General McNaughton, who had been a schoolmate at McGill, played a role in McNaughton's strong advocacy of the forestry camps for unemployment relief projects as well as his support of the Alternative Service Workers forestry camps in World War II. Cameron was a superb organizer and a great diplomat, as his later role with the FAO would prove. It is unlikely that a feud would ever have developed with British Columbia's chief forester, Orchard, had Cameron been the forest service negotiator.

Born in London, Ontario, in 1888, Cameron graduated from the University of Toronto in 1911 with a B.Sc. in forestry. He first became active with the Forestry Branch in the field seasons of 1906–1910 and entered it permanently in 1912 as district forest inspector for the railway belt of British Columbia. He came to Ottawa in 1922 as forest protection specialist, was made assistant director in 1926, and became the first Dominion forester on creation of the Department of Mines and Resources in 1936. Unfortunately, Cameron did not stay long in that post. He became involved in war work at the outbreak of World War II, and he never really actively led the service again. While he was with the forest service, he made his presence felt. He retired in 1947 to take his FAO post.

Despite the increase in research activities under Cameron, the position of the service was hardly a happy one. Before the Department of the Interior vanished in 1936, forestry had the status of a branch, one of six divisions making up that department, and Finlayson, as director of forestry, signed his annual report with that title in the annual report of the department. He had direct access to the deputy minister, and in any government department that is essential for effective operation. On its emergence the following year, the newly created Department of Mines and Resources was made up of five branches: Mines and Geology; Lands, Parks and Forestry; Surveys and Engineering; Indian Affairs; and

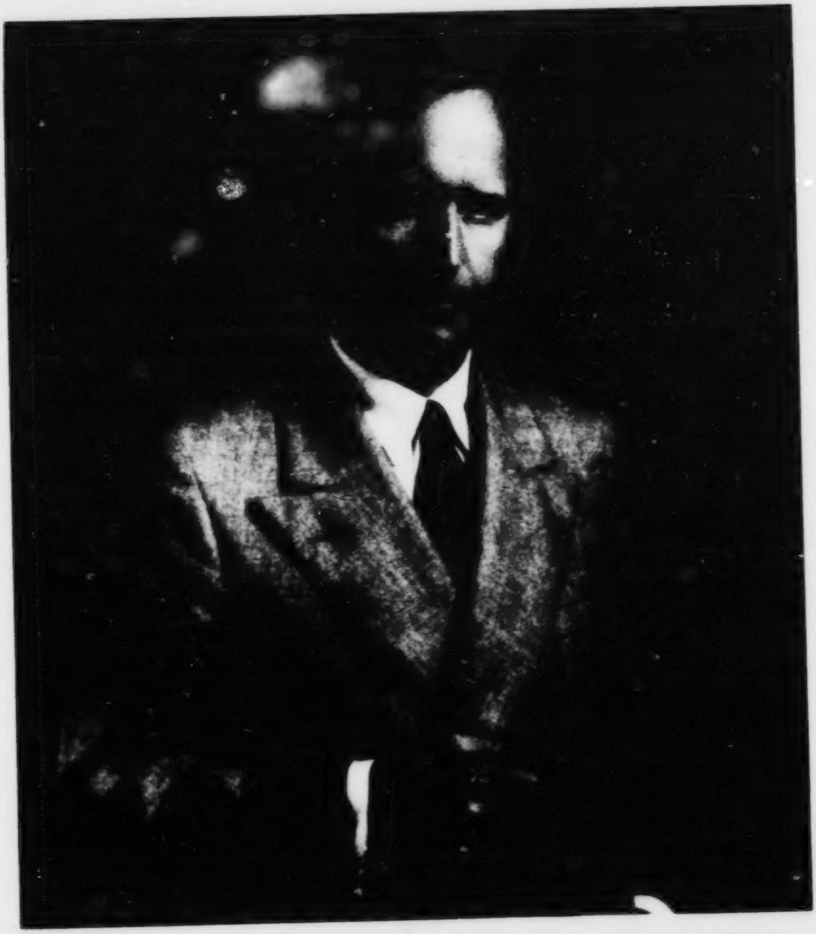


FIGURE 29. D. Roy Cameron, Dominion forester 1936–47. (Forestry Canada)

Immigration. In the second of these branches, forestry was listed as a division, last, after the Bureau of Northwest Territories and Yukon Affairs, Land Registry, and National Parks. The title director of forestry was changed to Dominion forester and the annual report of the service no longer bore the signature of its chief. In addition, the all-powerful deputy minister, Charles Camsell, was concerned chiefly with mines and had no active interest in forestry.

Yet a review of the achievements of the division during these hectic thirties, highlighted by the individual successes of talented staff members, gives the impression of an organization regaining confidence in itself. In forest economics, Seely's pioneering and developing the use of aerial photography for forestry was outstanding, but under Roland Craig the division showed other important achievements, and Harrison would give it further impetus.

Silviculture began to develop in the forest service in the thirties: the rate-of-growth surveys were developed, and R.H. Candy completed some brilliant summaries of existing information. The development of the new forest experiment stations widened the silviculture horizon from purely regional, at Petawawa, to national.

The service's conservation program was given powerful impetus by the National Forestry Program, even though the latter was of brief duration. During the spring of 1939 the service worked out the details and supervised the operation of this truly national effort, which held such promise. The program had been the result of the joint action of the Department of Labour and the Department of Mines and Resources. The purpose of the scheme was twofold: first, to employ young men between 18 and 25 who were unable to find employment and, second, to assist in forest conservation throughout Canada by employing these young people to set up fire-protection improvements, silviculture operations, recreational development, and fish-and-game conservation. A third purpose, unmentioned but obviously important to the service, was to revive its role as a manager and to present forestry to the public nationwide as a meaningful activity rather than one of obscure research.

The National Forestry Program was divided into two sections, federal and provincial. Under the former, work was carried out at federal forest experiment stations and in national parks. This section was under the immediate direction of what was then called the Dominion Forest Service, and it employed 1000 enrollees. The costs of the federal section were borne totally by the federal government. In the provincial section, the work was carried out in provincial forests, the costs being divided equally by the provincial and the federal governments. The immediate direction of work in provincial areas was a function of the provincial authorities, but the Dominion Forest Service was charged with the approval of plans for such work, as well as with inspections. The provincial services employed some 4000 enrollees.

The program called for work, recreation, and training for a period not exceeding 5 months. The rate of pay was $1 per day and included board, lodging, and medical services. Enrollees, after their applications were approved, were required to pass a medical examination.

Forest protection, the fundamental work of Wright, ably developed by Beall, raised the prestige of the service internationally as well as domestically. This achievement is even more remarkable because Wright's work, along with that of Seely, was accomplished despite the director's disapproval.

In forest products research, it is almost a case of an embarrassment of riches. Saving large companies like the railways $2 million with one piece of research, as Dr. Clara Fritz did, wins influential friends. The prompt reinstatements after the drastic Depression cut in the Vancouver laboratory is dramatic proof.

There was another remarkable achievement in the thirties by a member of the Dominion Forest Service staff, W.E.D. (Bill) Halliday. His book was not mentioned in the annual reports of the period, which surely could have used the kudos that it brought. Halliday's great work, *A forest classification for Canada*, was published in 1937 and is still considered a landmark of inspired research.

Born in England in 1897, Halliday earned a B.Sc. in forestry at the University of Toronto before joining the forest service in 1926. He was sent to the Pasquia Forest Reserve and served there, at Duck Mountain, and at Riding Mountain before joining the Winnipeg office, where he worked for most of the thirties. It was there he initiated the studies that led to his monumental achievement. Halliday explained how the work developed:

"I think it started by my experience with various surveys and the fact that I saw that there was a strong relationship between the forest stands and the vegetation. Also, I was intrigued with trying to improve the preliminary classification made by Dr. Fernow some 20 or 30 years earlier. I first of all started to work in Manitoba, where I happened to be at the time, and then I decided to extend this job, . . . and I finally covered the whole of Canada by a process of personal experience of the areas, by induction and deduction, you might say. I spent my own money going to British Columbia and down to the Maritimes. The only time I was paid, I think, was going to Quebec. A great deal of value was done by early surveyors. I would say that the earlier the survey, the better the information. Later surveys are very poor as far as forest information is concerned, but all the old geological surveys . . . going back to the 1820's, 1840's and so on, had a great deal of forestry information. We had some climatic records, but I was . . . offered the work of a meteorologist who was brought over from the University of Manitoba . . . he was then working on a new system of climatic classification. And he was good enough to take all the figures that were available in the various meteorological surveys and reports and draw graphs from them and work out these various climatic data, which I had outlined."

He described points of reference used to chart the swing that the forest makes to the north through Saskatchewan and Alberta:

"There were not too many; there were a number of stations down in the Mackenzie Valley. There were some towards Hudson's Bay. But you had to use a certain amount of intuition in deciding where the lines would go together. You used the distribution of the various tree species where you could determine them from the forest, and the percentage of those species had a great bearing on what I presume to be a viable forest section."

Concerning separation of the difference between fire types and later succession types in reports he said:

"I don't think you can do very much on that. That is why I say the original survey reports were the most important, because they probably showed the, more or less, original forest. And it was on the basis of the original forest you decided what section should be validated; not the fire types. . . ."

Like many other members of the forest service, Halliday shifted into war work at the outbreak of World War II, then served as assistant secretary in the Privy Council Office and became the first and only registrar of the Cabinet in 1952. He retired in 1963.

Perhaps Halliday was best described by R.H. Candy:

> ". . . Bill Halliday had a contempt for the small sample-plot, narrow view of forestry research that was being carried on at that time . . . he was rather contemptuous of what he considered to be the piddling efforts that we were making with our little small experiments and controversies. . . . His idea basically was to take the thing on a large scale, and he was most successful. . . ."

It was the work of Halliday and people like him in the federal forestry service that restored pride in the ranks, spurred others on, and maintained morale during the challenges of World War II.

# 21. Forest Entomology and Plant Pathology, 1918–45

The period between 1918 and the end of World War II has been characterized for entomology generally in Canada as "a quarter century of slow but steady progress." During this period Canada's farming and forest industries spread and matured. At the same time, the threat from insects increased. Grasshoppers, cutworms, wireworms, and the wheat stem sawfly wrought repeated and heavy damage to the western grain crops and serious infestations developed in stored grain, particularly during wartime; warble flies and the horn fly plagued livestock; orchards were seriously threatened by the codling moth; and the forests suffered damaging invasions of spruce budworm, the European spruce sawfly, the hemlock looper, and several species of bark beetles. The widespread economic depression of the thirties dried up the funds desperately needed to launch a counteroffensive. Nevertheless, progress was made at the federal level under the leadership of people like Gibson, McLaine, Swaine, Treherne, and de Gryse.

Federal laboratories and staffs were gradually increased, and a quarantine laboratory was built at Belleville, Ontario, in 1936, with special facilities for the propagation of imported parasites and predators. Another landmark was the Forest Insect Laboratory at Sault Ste. Marie, which was built in 1944 by the Ontario government and staffed and equipped by the federal Department of Agriculture. These, however, were striking exceptions to the generally inadequate federal buildings and laboratory facilities that continued during the Depression and war and to an applied entomology founded almost exclusively on field projects that developed in the face of emergencies.

Organizationally, the most significant event of the period was the creation of the Science Service, in 1937, as the main scientific arm of the Department of Agriculture. It was made up of five research divisions: entomology, botany and plant pathology, animal pathology, chemistry, and bacteriology and dairy research. The former Entomology Branch became the Entomology Division of the Science Service, and the former Division of Foreign Pest Suppression was divorced from entomology and included in a separate Plant Protection Division, with L.S. McLaine in charge, and transferred to the Production Service. From there it returned in 1942 as the sole regulatory division in the Science Service. J.M. Swaine directed the new service until his retirement in 1945.

Meanwhile, Swaine had established the basis of an applied forest entomology in Canada. Each development was a rescue operation. George Hopping described one of these that occurred in British Columbia:

"Back in 1919 forest entomology was in its infancy in Canada and it wasn't very much further advanced in the United States. . . . Outside of Ottawa there was practically nothing in the way of laboratory development. Now, it so happened that between 1910 and 1920 some very serious outbreaks occurred in the ponderosa pine stands of south–central British Columbia, in the Merritt–Nicola country. This greatly disturbed the mill operators in that region. . . . The outbreaks were taking a lot of timber that the mill would otherwise cut later. The provincial government had no one in British Columbia capable of handling forest bark beetle outbreaks. So they went to the federal government and asked Dr. J.M. Swaine what could be done. . . . Dr. Swaine looked over the proposition . . . and decided that a laboratory should be established there primarily to handle the suppression of these outbreaks. . . . There was no one in Canada with any experience in the suppression of bark

FIGURE 30. Dr. J.M. Swaine.
(Forestry Canada)

FIGURE 31. Dr. G.R. Hopping.
(Forestry Canada)

beetle outbreaks. There were three men in the United States; one was my father [Ralph Hopping]. Dr. Swaine wrote to my father and asked if he would come to Canada and establish a forest insect laboratory in British Columbia. Although the salary was not much more than my father was getting at the time in California, he decided to come because he would be allowed to publish his scientific articles on insects. He was not allowed to do this in the United States because of the foibles of a certain man who was in charge of the Bureau of Entomology in Washington, D.C., at the time. . . .

"I'd say that the first forest insect laboratory established outside of Ottawa was the one established by my father . . . in the court house in Vernon. Our main task required a know-how as to dealing with the forest entomology problem in the field . . . so my father's first job was to organize the control crews. We had anywhere from 30 to 40 crews and the system was to cut the trees, strip the bark from them, line the bark along the side of the trunk and burn the bark beetle broods so that they could not emerge the following year and infest more trees. This was the procedure that was carried out in bark beetle control for years and years, until some of the chemical methods were developed."

Although plant pathology as a separate science on the federal scene dated back to the appointment of H.T. Gussow as botanist in 1909, the story of forest pathology really began in 1914 when shortly after white pine blister rust was found in Ontario, the Botany Division and the Ontario Department of Lands undertook a cooperative study of the rust and its distribution. As the disease continued to spread, the cooperation of the Forestry Branch was enlisted.

About this time Dr. J.H. Faull of the Department of Botany, University of Toronto, began to study diseases of forest trees in cooperation with E.J. Zavitz, the provincial forester. One of Faull's early graduate students was A.W. McCallum. After receiving his M.A. under Faull in 1920, McCallum joined the Botany Division as its first forest pathologist. He continued the work on the white pine blister rust, which soon spread far beyond the original infected white pine plantations.

In British Columbia, as in eastern Canada, major attention was first directed to problems of forest disease after the initial discovery of white pine blister rust on western white pine. Although preliminary scouting for the disease had been carried out in 1918 by Provincial Plant Pathologist J.W. Eastham, the first authentic record of its occurrence, in 1921, provided the necessary stimulus for widespread major concern. Quarantines were established to prohibit the movement of pine and *Ribes* between coast and interior regions of the province, and in 1922 A.T. Davidson of the Botany Division in Ottawa was asked to supervise an extensive survey in cooperation with the Forestry Branch and the provincial authorities.

In Quebec, research on tree diseases dated back to about 1915, when Professor W.P. Fraser carried out his first studies on conifer rusts at Macdonald College. In 1917 Fraser found the uredinial and telial stages of the white pine blister rust on *Ribes* and soon after the aecial stage on white pine. In 1918 G.C. Piché, founder of the Quebec Forest Service, published one of the first accounts of the epidemic nature of this disease in Quebec and elsewhere in Canada to warn the public and the authorities of the threat that this newly introduced parasite presented.

After 1930 the history of forest pathology in Quebec is closely linked with René Pomerleau. He studied plant taxonomy and learned to identify many of the fungi, particularly those collected in the forests. In 1930 he accepted a temporary assignment with the Quebec Department of Lands and Forests to study seedling diseases at the provincial forest nursery at Berthierville. Pomerleau was asked to organize the protection of forest nurseries and plantations against the white pine blister rust by *Ribes* eradication, and to carry out a survey in the southwest of Quebec to locate white pine stands and determine the feasibility of the control of the disease. Also, between 1931 and 1937, Pomerleau carried out a comprehensive study of the Gnomonia leaf spot of elm and produced a 200-page book on the study. Gradually he developed a general survey of tree diseases and built up a mycological herbarium. Concurrently studies were carried out on elm leaf blister, the ink spot disease of aspen, willow scab, snow blight, and a few other tree defects. He also acquired a knowledge of forest ecology through an extensive study of the vegetation in several areas of the province to define the various sites by plant associations. In 1935 Pomerleau was appointed professor of forest pathology at the Forest Rangers School at Duchesnay and in 1938 he was given a permanent appointment and transferred to Quebec City to establish a forest pathology laboratory under the sponsorship of the province. In 1940 he was appointed professor of forest pathology in the Faculty of Forestry at Laval University to give a course previously taught by Dr. Maheux. He also delivered a series of lectures on mycology and plant pathology to Laval's biology students.

Immediately on his transfer to Quebec City in 1938, Pomerleau instituted a long-term investigation of conifer decay. Between 1938 and 1944 more than 20 000 trees were analyzed to determine the volume of wood rot in relation to tree age and size in various districts of Quebec. A survey in hardwood stands was concurrently carried on in southern Quebec to obtain information on the occurrence and extent of decays, cankers, and a variety of other diseases. Special studies were also carried out on the dwarf mistletoe of black spruce, sunscald of maples and other species, and some conifer rusts; the tree disease survey was considerably extended and the mycological herbarium greatly enlarged.

The wartime period in Quebec was marked by two serious developments: the birch dieback and the invasion by Dutch elm disease. The dying of birch trees had been observed by Dr. Faull as early as 1923 in the Saguenay area and by Pomerleau in 1933 in southern Quebec. In 1942 and 1943 there was extensive dying of white and yellow birches, mainly in the lower St. Lawrence region. Several observations were made in these 2 years in stands showing these symptoms and because of the uniformity of the symptoms on nearly all the trees in a given stand, it was postulated that climatic factors were the cause.

Soon after the discovery of Dutch elm disease in the United States in 1930, Pomerleau had sampled several elm trees showing wilting and made cultures from them, but only in 1944 was the pathogen obtained in culture from a diseased tree in Saint-Ours, near Sorel. Immediately a survey was organized to determine the area of the outbreak. Later Pomerleau showed the invasion occurred in or near Sorel, an ocean port, where the organism had been carried before 1940 in crates made of elm from France. In cooperation with the federal Department of Agriculture, a large-scale survey began in 1945 to detect all infested trees with a view to limiting the advance of the disease if not eradicating the pathogen. After 2 years of intensive work, it became obvious that the outbreak had invaded too large a territory to be eliminated.

W.N. Keenan, characterizing Dutch elm disease as "the worst enemy of tree population we have ever experienced because it spread so fast," described the situation when the disease was first reported by Pomerleau from the Sorel area, and his report was verified by United States authorities. The question of a survey and some control activities arose in Ottawa:

> "But nobody had any money. In our Department there was certainly no spare cash for any such survey. Representation was made to the government for a contribution in order that this could be undertaken, and I recall at the time that Dr. Swaine informed me there was nothing doing; there was no money available. So he called Dr. Gussow and told him that the project was off, because Dr. Gussow's staff were supposed to collaborate for laboratory testing. . . .
>
> "I had some experience through other activities with the Clerk of the Estimates . . . and I made an appointment with him. I took along a brief record of the disease photographs, and so on, and told the Clerk all about it, and handed him temporary estimates for $41,000; and I said, 'You can imagine what Wellington Street here would look like.' He was in the East Block, and he could look out his window and there was a big elm tree. I said, 'As an example, this disease could knock that elm tree out in 24 hours; it's as good as gone.' . . . 'Well,' he says, 'you have a formal submission in to me tomorrow afternoon not later than three o'clock,' . . . and I left in high spirits. . . . Oh, yes, the Clerk of the Estimates told me that it wasn't possible to get any money except through the war appropriation. So he said, 'I will recommend to the Treasury Board that this amount be loaned to you from the war appropriation and then you put supplementary estimates

through later in the year,' or something to that effect. So I reported to Swaine, and Swaine called Gussow and said, 'Get ready! We're going to go.'

"So then it was a question of organizing it with the Province of Quebec and the idea was to have a 50-50 man contribution to the survey. Eventually we got started. We had a man come up from the States and we had all our crew there at Berthierville. We had lots of disease around there too. The man from the States came up to show our scouts how to climb a tree to take samples of suspected elm twigs and so on. We got going and, as a result of the first year of survey, we found an infection of an area of about 30 miles wide, 60 miles long, along the river and, again, Sorel was regarded as the center of the outbreak.

". . . In the second year, 1943 . . . the equivalent organization was arranged for the scouting, and a much wider area was covered during the survey of that year, including extensive observations through eastern Ontario, and, of course, in the odd spots elsewhere

FIGURE 32. The first tree in Quebec known to have Dutch elm disease. Discovered in August 1944 at Saint-Ours, about 18 km south of Sorel, by Dr. René Pomerleau. (Photo by Dr. Pomerleau)

where staff was located. However, during that survey it was found that the disease had spread still further, and there was a general review of the program resulting in the decision to discontinue the survey, since no action was apparently possible. I have always agreed in removing the diseased trees, even in partially infected areas covered by the survey. In a number of cases such as the Sorel area, even in those early years, the number of trees infected was so great that no one could afford to cut them down or otherwise dispose of them. There were many requests by individual property owners . . . to remove the trees on the basis of preventing further spread, but . . . the cost was too high to consider."

In 1972 George L. Miller, retired provincial forester for New Brunswick, vividly described the effect of a budworm epidemic. He pointed out that the first recorded outbreak in New Brunswick occurred in 1809, the second in 1878:

"The third one, the one I had the most to do with in the early days, was 1909 to 1920, and it was very extensive, particularly in the fir forests. Then the final one was 1950 to the present time. . . . The third one, 1909 to 1920, I happened to be in forestry surveys, and it was in the wintertime. It looked just as though a fire had got at it. The snow went right through the woods and hardly a tree standing. Those were fir forests and this was the result of the cutting method at the time. Because you couldn't sell fir very well, but you could sell lots of spruce, so they cut the spruce and left all the fir. So we had an abundance of fir in the forest and, naturally, when the spruce budworm got going in an epidemic stage, there was nothing we could do to stop it . . . and this was some of the finest forests I have ever seen . . . the insect did get into the spruce and finally died of starvation, I suppose, because it killed practically all the fir. . . . Of course, after the budworm epidemic, the fir came up just like weeds, and today you would hardly know there had been an epidemic there."

The most significant event of the between-wars period was the initiation of the Forest Insect Survey in 1935. This, of course, was expanded after World War II as the Forest Insect and Disease Survey. Survey activities at Ottawa headquarters were under the general direction of Dr. A.W.A. Brown. All the records and results from all parts of Canada were deposited at the Ottawa laboratory for study and correlation. Besides functioning as a general clearing house, the Ottawa laboratory was engaged in the active study of the entire region situated north and west of the St. Lawrence and extending north of the Great Lakes to the Manitoba boundary. The eastern section was headquartered at Fredericton and covered the Maritime provinces and the province of Quebec east and south of the St. Lawrence. R.E. Balch was in charge, and winter work was carried on in the Dominion Entomological Laboratory on the campus of the University of New Brunswick.

In British Columbia, the survey had just begun that past summer. The laboratory at Vernon was the center of activities and the summer work was conducted at Trinity Valley. The redoubtable Hoppings — Ralph and George, father and son — directed the work, assisted by Messrs. H. Leech and K. Graham, along with two seasonal workers.

In the Prairie provinces, work had not yet been fully organized, although the forest service of Saskatchewan had taken the initiative and laid the foundation for a regular forest insect survey. A laboratory established at Winnipeg in 1937 had been visualized by J.J. de Gryse as a center for northwestern Ontario as well as the northern section of the Prairie provinces, Indian Head taking care of the southern regions.

## 22. World War II and the Dominion Forest Service

World War II was a period of marking time for the Dominion Forest Service. Except for the forest products laboratories, much of the service's work came to a standstill as personnel at all levels enlisted in the war effort, just as they had in World War I. Possibly the most ironic war casualty was the National Forestry Program. Almost all the enrollees enlisted in the Canadian armed forces, and this most successful, promising program came to an abrupt end, never to be revived.

The main effort of the forest products laboratories at Ottawa and Vancouver was directed to war work. Preparations of specifications calling for the use of Canadian woods in place of imported woods, design of munition containers, and special tests were undertaken for the Department of National Defence and the Department of Munitions and Supply. The laboratories were consulted extensively by war industries to solve special problems in the use of wood or wood products.

Regarding the organization of the Canadian Forestry Corps, lists of trained forest officers were provided for the commanding officer. After the establishment of the office of the timber controller for Canada in the Department of Munitions and Supply in June 1940, the Dominion Forest Service cooperated closely with that officer.

Cameron recorded the loss of the Pulp and Paper Research Division optimistically:

"One of the outstanding advances in the fiscal year was the completion of an agreement with the Canadian Pulp and Paper Association and McGill University for the foundation of the Pulp and Paper Research Institute of Canada at Montreal. This agreement provided for unified direction of pulp and paper research on an expanded scale. The staff of the Pulp and Paper Division of the Forest Products Laboratories located at Montreal has, under the terms of this Agreement, been loaned to the Institute. Since its establishment, the Pulp and Paper Institute had undertaken important investigations having to do with the war effort."

Although in purely political terms the service had given up one of its key reasons for assuring the support of the pulp and paper industry in the annual struggle for programs and budget that every sector of government faces, it was spawning an organization that would later prove a keen competitor for government research dollars. Of course, in the field of research, the service was abdicating one of the most important fields of forestry — pulp and paper. In retrospect, one may well wonder at the reasoning behind Cameron's appraisal.

By 1942 a serious fuelwood shortage was developing. In view of the widespread reliance on this type of fuel, and the difficult coal situation, a deputy administrator (of wood fuel), under the coal administration, was appointed to deal with the problem. The Dominion forester was appointed to this position and several senior officers of the Dominion Forest Service were assigned to assist him in wood fuel administration.

In the section of the annual report that dealt with silviculture research, an interesting item foreshadowed the future:

"Improved technique in cross-pollination, hybridization, vegetative propagation, and seed-bed treatment has been developed. Numerous strains, particularly of pines and spruces, that appear to be resistant to fungus and insect attack have been selected. . . ."

By 1943, attention was being focused increasingly on postwar planning. In May of that year the provincial ministers in charge of forestry presented proposals to the minister of Mines and Resources for increased federal participation in forestry, particularly regarding fire protection and research. In September the report of the Subcommittee on Conservation and Development of Natural Resources of the Committee on Reconstruction, which included plans for forestry, was presented to the federal government. The assistant Dominion forester, who had been working with the subcommittee, reported the provinces agreed that during the postwar reconstruction period work projects should concentrate on forest protection improvements and the provision of adequate transportation facilities for the extraction of forest products. Several provinces also proposed that the federal government undertake a comprehensive plan for aerial photography to acquire data for a national forest inventory as well as for planning of postwar forestry projects.

In other respects, the year passed much as the previous one, deep in wartime activities, with a skeleton staff. George Tunstell, former chief of silviculture and later the

FIGURE 33. Alternative service workers leaving for work, British Columbia, 1942. (Forestry Canada)

assistant Dominion forester, recalled his work with the alternative service camps and the conscientious objectors:

> "Conscientious objectors, as the name indicates, were those recognized by the mobilization boards as having exemption from military service. I was connected with this program rather intimately. . . . Camps were established throughout Manitoba, Saskatchewan, and Alberta and I went on . . . inspection work. . . . I recall that at one camp up in the Prince Alberta National Park . . . I asked the foreman, 'If you had an opportunity to go out and hire a work crew, would they be any better than the men you have here?' His reply was, 'I don't think they would be as good.' Now these men, a large number of them at least, were Mennonites and most of them were farm lads and they were used to labor and, moreover, at that time they were in for only a limited period. . . . But before the six months was up, there was an amendment under the Mobilization Act and this alternate service was made for the duration of the war. Of course that was quite a shock to many of the lads . . . but I must say that, in all fairness to them . . . they took it very well, and they performed a wonderful work service. I was quite proud of them as workmen."

At the end of World War II, the annual report of the Dominion forester reflected a curious note of new-found optimism and self-confidence concerning the role of the service, and a willingness to assert that role firmly. Not since the service had gone underground politically in the early thirties had there been such a confident ring to the annual report. Its preamble came as close to outlining a national forestry policy as any government document on record to that point. After noting with gratification the "gradual return of some 33 per cent of the professional and technical officers of the staff who had enlisted in the Armed Services," the report stated that the much-loaned Dominion forester had again been loaned, this time to the Department of Reconstruction as deputy coordinator and, subsequently, as acting coordinator of Resource Development. The assistant Dominion forester, D.A. Macdonald, had been appointed acting Dominion forester. As a matter of fact, Cameron never did return to the forest service.

Cameron described the overall effect of World War II on the forest service:

> "The general idea in government circles during the war was that a depression would follow the establishing of peace. The Dominion Forest Service, in common with other government organizations was asked to prepare a shelf of projects which could be quickly put into effect for unemployment relief. As a matter of history it is known that instead of a depression the World War was followed by a boom period, and these projects were not needed at the time. From the Forest Service standpoint, actually, appropriations were increased and research work particularly was expanded, both in forest research and forest products laboratories."

Cameron himself was loaned in 1942 to the Wartime Prices and Trade Board as deputy administrator (of wood fuel) under the coal administrator, and then in 1943 to the Department of Munitions and Supply as assistant fuel controller. When C.D. Howe headed the Department of Reconstruction in 1946, Cameron moved with him to the new department as deputy coordinator, Resource Development, and in 1947 was chief Canadian delegate and vice-chairman to the Empire Forestry Conference in England. Then he became involved with the Food and Agriculture Organization (FAO) of the United Nations. He recalled the circumstances:

> "Before dealing with the FAO itself, I must go back to the Interim Committee on FAO in Washington in 1944, of which the Hon. L.B. Pearson, the Ambassador to Washington, was Chairman. I was a Canadian delegate, accompanied by Mr. Jack Harrison, at the meeting in Washington. Foresters from all the interested countries were present at these meetings. It early developed that the departments of agriculture of the various countries expected to obtain complete control of all the resources development. We foresters decided that we did not have to recommend to our governments that forestry be placed under FAO at all, and I, as a Canadian, was delegated to interview the Chairman and lay down our point of view in no uncertain terms. I told him that we would recommend nonparticipation of forestry unless we were accorded what we considered our fair share of the plum cake. Mr. Pearson assured me that this would be done. There was also a strong forestry delegation at the founding conference of FAO in Quebec in 1945. Forestry was granted a directorate as also was Fisheries. Agriculture got at least three directors. However, the forestry delegation was, on the whole, well satisfied with the results of the conference."

Cameron retired from the forest service on October 31, 1947, to join FAO, which appointed him chief of the European Forestry Office. In the United Nations, he was appointed director of the Timber Division of the Economic Commission for Europe, with headquarters at Geneva. In 1951, when the headquarters of FAO was moved to Rome from Washington, he was transferred to Rome and appointed chief technical assistance officer, Forestry, under an expanded technical assistance program. His appointment terminated in December 1953, when he became 65. The same year he served as a commissioner on the Royal Commission for Forestry for the province of Newfoundland. In the archives of the federal forestry service there is a letter addressed to Cameron from the secretary-general of the United Nations, thanking him for his effective work for that organization.

While working for FAO, Cameron negotiated the agreement with the International Union of Forest Research Organizations for the integration of the activities of the two organizations, and he became the first FAO member of the union's governing council. He was the personal representative of the secretary-general of the United Nations at the Third World Forestry Congress, held in 1949 in Finland, and delivered the opening address on his behalf. He was also a member of a special FAO mission to Austria to advise the government of that country on forestry policy and the development of forest industries. He was a one-man mission as forestry adviser to the Government of Eire in 1950 and a forestry expert on the FAO technical assistance mission to Israel in 1953.

We have already traced J.D.B. (Jack) Harrison's career to 1940, when he was made chief of the Economics Division of the service. Later that summer he moved to timber control in the Department of Munitions and Supply, and then served on the Timber Depletion Committee set up under the Income Tax Act to solve certain problems raised by the timber industry. Towards the end of 1941 he returned to timber control as supervisor of their Statistics Division. Later, D. Roy Cameron and Harrison were made members of the preparatory Technical Committee on Forestry of the Interim Commission for FAO in Washington. In 1945, Harrison was one of the Canadian representatives at the Quebec conference that established FAO, and the following June was invited to join the staff of FAO as chief of the forest economics section. Harrison described Cameron's contribution to FAO:

> "At the beginning of 1947 Cameron joined FAO and went to Europe as the head of the Forestry Commission for Europe. Now this was a very tricky assignment and he handled it beautifully. It had been the policy of the Director of Forestry and Forest Products Division . . . that these regional commissions should be set up. The European was the first one, and it was to consist of the Chief Foresters or corresponding ranks of each country, and there was a little fear that some of these old boys who were pretty distinguished characters and highly skilled men . . . might not like too much a Canadian being set over the administration of their Commission. But in no time at all Cameron had the finest relations with all of them. This was a wonderful job, probably the biggest job he ever undertook. I don't think it could have been done . . . better. He had a lot to offer."

The forest service emerged from World War II with casualties but intact as a unit and ready to take advantage of postwar opportunities. Its organization and its entire staff had acquitted themselves well. Seely had been engaged in top priority work, mapping and classifying French forests before D day. Wright's work would be continued by Herbert W. Beall. Cameron's position would be ably filled by the aggressive, tough-talking D.A. Macdonald, who would prove to be the right man to fight for funds as the service exploited postwar opportunities for growth.

# 23. The Wallace Report and New Developments

The importance of forestry as a national concern has varied with the political climate ever since Confederation. This, of course, has been reflected in the history of the federal forestry service. Each rise or decline in the fortunes of the service may have its own particular set of circumstances, but it seems that only at times of national crisis does forestry suddenly become the concern of the nation as a whole rather than simply a resource belonging, according to the terms of Confederation, to the individual provinces.

In both World War I and II the forest industries provided a significant source of foreign currency in the annual balance of payments as well as vital materials for the allies. The service itself fitted smoothly into the war machine. Immediately after each great conflict, the increased national concern with forestry was carried into the postwar years and was reflected in a rise in the fortunes of the Dominion Forest Service. In each case, however, the concern never crystallized into a national forestry policy that might have offered a coherent framework for further consistent and rational development of this great renewable natural resource.

The failure was not due to lack of a plan. As far back as 1943, the Subcommittee on Conservation and Development of Natural Resources, which was a division of the Advisory Committee on Reconstruction and was chaired by Dr. R.C. Wallace, principal of Queen's University, had presented a report that in the words of the Canadian Forestry Association, "sets forth a dynamic programme which in general has the approval of Dominion and Provincial forest services, of the forest industry, and of the public."

Many of the recommendations in the Wallace Report would ultimately be carried out, but its purpose, the development of a national forestry policy, would not be realized. The report began with seven general recommendations, the first being that the suggestions be given immediate consideration so that they could be put into effect as soon as the war ended. It called for the establishment of regional committees representative of all resources to advise the National Development Board. Conservation measures should be put into effect immediately. Electrical power should be provided for farms and rural towns lacking it. The need for surveys — aerial, topographical, geological, forest, wildlife, fisheries, and soil — was urgent. A training program for the men needed in the development and conservation of resources should be set up immediately. An early decision should be reached on cost-sharing between the federal and the provincial authorities concerning the policies to be implemented: "The longer-term programmes of conservation, of research, and of surveys may be considered to be properly the responsibility of the Federal Government."

The report dealt with 23 different aspects of forests and forest industries, the first of which was the fact that the development of permanent and prosperous forest industries was a priority: "Forests are a renewable asset. Unfortunately, they are also destructible." It emphasized that 58% of the land area in the nine provinces was forested. (In Newfoundland, not then in Confederation, the percentage was even greater.)

It stressed the economic importance of the forest industries. In 1941 such industries employed almost a quarter of a million persons, directly supporting well over another half million. The net value of products was approximately $537 million and, in external trade, provided a credit balance of more than $350 million. Forest industries export the bulk of their production; in the postwar years that export market would become increasingly competitive. Dominion and provincial governments must share in the task of securing and holding adequate markets. Consequently, Canadian production costs had to be kept to a minimum and the quality of the marketed product had to be improved. All the raw material available in the forests had to be utilized and forestry balance sheets had to be compiled for each forest region.

The report called for management plans providing for forest industry requirements, employment for local populations, recreation, watershed protection, and wildlife conservation. It pointed out that annual growth in Canada was estimated to be about 1 $m^3$ per hectare (14 $ft^3$ per acre), whereas in Scandinavian countries scientific treatment yielded 2 $m^3$ per hectare (28 $ft^3$ per acre), which could be equalled and even exceeded in Canada with proper silviculture. The most serious obstacle to the introduction of planned management for forest holdings, the report said, was the forest fire problem; and serious losses had been incurred through insect attacks and fungous diseases:

> "Sound management of forest lands must be based on accurate and adequate data. . . . To prevent duplication of effort and to secure uniformity, it is proper that the Dominion should have assumed the main responsibility in this field. Unfortunately, the support given to silvicultural research to date has been far short of the need."

The report similarly called for expansion in forest products research at both federal laboratories, which were hampered in their work by lack of funds and inadequate staff.

Finally, the report called for the replanting of barren areas and the development of farm woodlots and pointed out the value of forests in the tourist trade, the preservation of wildlife, waterpower development, and water table conservation. It concluded by calling for better public education to make the people of Canada forest-conscious.

After these general observations, the report made its recommendations. There were three headings: preparatory measures, immediate postwar measures, and long-term measures, amounting to 32 specific proposals. Under preparatory measures, there were six proposals:

1. The National Development Board and regional advisory committees recommended by the Advisory Committee on Reconstruction should be established immediately.

2. Provincial forestry plans should be assembled and submitted for review by the advisory committees. National Development Board plans should be recommended to the Dominion government and segregated into transition-period and long-term projects. Transition-period projects should be mainly provision for better fire protection and more adequate facilities for transportation from woods to mill. As soon as approved by government, they should be developed fully for immediate execution at the appropriate time. Except for projects concerning operations on Dominion lands, forestry projects should be covered by specific agreements between the Dominion and the province concerned. Responsibility for the actual conduct of work should lie with the province, and Dominion participation should be restricted to the agreed provision of funds and inspection of operations to ensure compliance with the terms of agreement.

3. A Forest Resource Rehabilitation Act should be passed at the next session of Parliament to provide for the training of some 15 000 men for each of the next 5 years and it should contain the following provisions: authorization for the minister of Mines and Resources to enter into agreements with other government departments and with provinces and industries for the prosecution of forestry works or activities; authorization for

forestry projects on Dominion and Indian lands; arrangements for the pretraining of staff; apprenticeship schemes for returned soldiers, munitions workers, and unemployed youth in forest industry or woods operations; establishment of scholarships for undergraduate and postgraduate studies in all aspects of forestry; and the creation of short training courses in woodlot management.

4. A Dominion Forest Act should be passed at the next session of Parliament to provide a legislative basis for the operation of forest experiment stations and forest products laboratories; the administration of national forests; agreements with provinces, universities, or industry for the prosecution of all types of forestry activity; the acceptance of grants, lands, forests, or goods for forestry purposes; the appointment of honorary forest officers to provide voluntary services to protect the forests; the granting of financial assistance to the provinces for all phases of forest development; contribution by the Dominion of half the cost of the purchase of private land by the provinces for forest purposes.

5. The Dominion Forest Service should be established as a separate technical branch of the Department of Mines and Resources, thereby assigning to forestry the standing in the Dominion government administration that its importance warrants and placing forestry on a basis equivalent to mining.

6. The Dominion Forest Service should be provided with funds and trained staff adequate to undertake the Dominion government's obligations in the forestry field.

Immediate postwar measures called for accelerated demobilization of forestry-trained personnel from the armed services; prompt inauguration of forestry projects to meet expected postwar unemployment; institution of apprenticeship schemes; reestablishment of the National Forestry Program; a comprehensive aerial photography program; expansion of map production facilities; training facilities for interpretation of aerial photographs; resumption of rate-of-growth surveys; an expanded program of soil surveys; appraisal of waste lands; accelerated planting programs; RCAF facilities to undertake fire detection patrols; provision for use in forestry projects of available surplus army or air force equipment suitable for that purpose; resumption of administrative control and management by the Dominion government of the eastern slopes of the Rocky Mountains; and, finally, the convening by the prime minister of a national forestry congress.

The congress would deal with a series of items ranging from forest protection standards to the possible establishment of a national forest policy committee including the involved federal and provincial ministers. Other items on the agenda would include market extension requirements; continuity of tenure of forest holdings; reduction of anomalies between provinces; development of a satisfactory program of future taxation of forest lands; marketing facilities, tax concessions, or subsidies required to reorganize forest industries on a multiple-product basis; forestry and forest products research requirements; proper land use; measures to complete a region-by-region stocktaking; use of the forest resource for recreation, wildlife conservation, and watershed protection, and their correlation with industrial requirements; and better education of the general public on the importance of forests and forest industries in the economic life of Canada. It was a full agenda.

Long-term measures proposed in the report called for the development of forest protection to make forests a commercially insurable risk; planned natural resource development; 99-year renewable leases to essential industries of sufficient continuous forest area to provide a continuous flow of raw materials, the balance of the forest estate to be set aside in provincial or municipal forests and managed for sustained yield by trained foresters; provincial legislation requiring management of private forest lands to conform to standards; provincial inventories correlated by the Dominion Forest Service; maintainance of extensive and up-to-date research facilities by the Dominion Forest Service; employment of extension foresters by the provinces to advise and assist municipalities and woodlot and other forest owners on proper management; establishment by the forest industry of a centralized forest products institute to correlate all interests and speak for the industry as a whole; expansion by the Dominion and provincial governments of trade promotion work; and, lastly, adequate Dominion assistance to the provinces for forest purposes.

The Wallace Report of 1943 was a practical document endorsed, as the Canadian Forestry Association noted, by the federal and provincial forestry services, the powerful forest industry, and those members of the public for whom the association could speak. Yet, no bill was passed; no congress was held. Clearly, forestry was not a priority for William Lyon Mackenzie King, and he did not have an Elihu Stewart to keep him posted on forestry. Also, there was a war on. But what probably killed the program was the postwar boom. The government had expected a postwar slump, as after World War I, and the forestry program would have proved a valuable weapon to combat it. Instead, the boom of the late forties made all government emergency plans redundant, and the forestry program lost its urgency. Nevertheless, the report did benefit the Dominion Forest Service, as reflected in the granting by Parliament, in 1946, of increased funds for research.

The service was now made up of our four divisions: Forest Economics, Forest Air Survey, Silvicultural Research, and Forest Protection, together with the forest products laboratories. All divisions and the laboratories reported greatly expanded activity in a year when production in the forest industries reached a higher level than previously in peacetime.

In 1947, D. Roy Cameron left the Dominion Forest Service to join the FAO and Macdonald replaced him. There was a great contrast in the style, manner, personality, and method of operation of the two men. D. Roy Cameron was a quiet-spoken, careful, calculating operator, with a reputation for smooth efficiency. Donald Angus Macdonald was a big, outgoing man who made warm friends and bitter enemies.

D.A. Macdonald was born in 1892 in Saint John, New Brunswick. He graduated in forestry from the University of New Brunswick in 1914, joined the Forestry Branch of the Department of the Interior, and was sent to the Calgary District Office. In World War I he served in France as a pilot in the Royal Flying Corps.

Macdonald was demobilized in 1919 and rejoined the Forestry Branch. He was posted to Kamloops and subsequently to Winnipeg. In 1928 he was transferred to Ottawa as fire protection specialist. While at Kamloops and Winnipeg, Macdonald established himself as one of the pioneers in the development of systematic training for forest rangers. He was chiefly responsible for organizing cooperation in fire protection work between the Forestry Branch and the Royal Canadian Air Force in the Manitoba District. As fire protection specialist in Ottawa, Macdonald worked closely with the provinces to organize the series of standardized forest fire protection statistics, which is still in effect. He was also a strong protagonist of the fire protection research program, which developed, among other things, the Wright system of fire danger measurement.

Macdonald was appointed assistant Dominion forester in 1936 and acted for Cameron

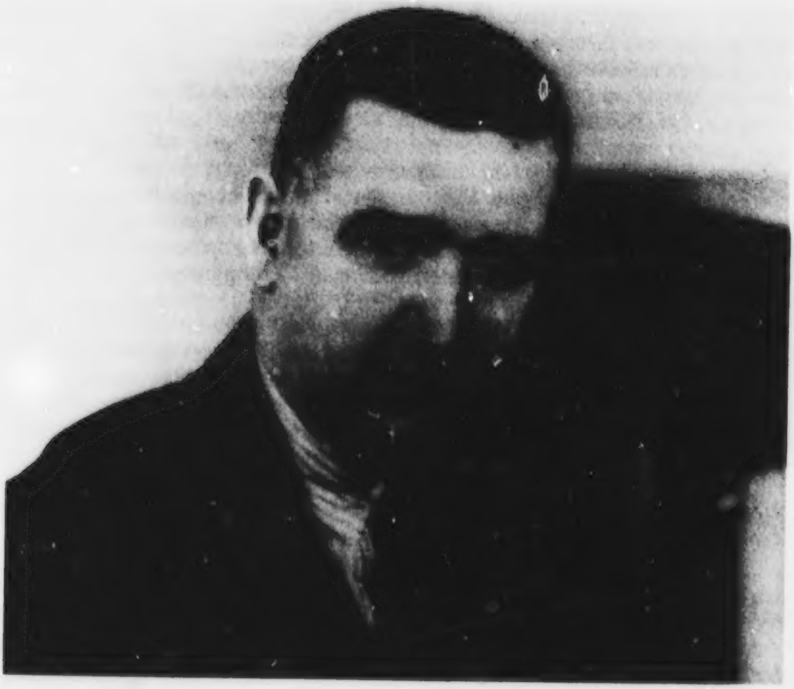


FIGURE 34. D.A. Macdonald, director of Forestry Branch 1948–56. (Forestry Canada)

during the latter's lengthy leave of absence, which began in the early war years. In 1939 he organized the National Forestry Program for Youth Training. He was also chairman of the Forest Insect Control Board.

As Canadian member of the Advisory Committee of the Forestry and Forest Products Division of FAO, Macdonald represented Canadian forestry at sessions of the FAO Conference in Washington and Rome, and attended the Third World Forestry Congress in Finland in 1949, and the fourth congress in India in 1954. He was head of the Canadian delegation to the Conference on World Pulp Problems organized by FAO and held in Montreal. He served for many years as a director of the Pulp and Paper Research Institute, and also as a director of the Canadian Forestry Association. In 1952 he was chairman of the Sixth British Empire Forestry Conference, at which Canada was the host country. Shortly before his retirement in 1956, he received the annual Forest Conservation Award from the Canadian Forestry Association. He died on May 5, 1957.

Macdonald was influential as Dominion forester, and the Forestry Branch made important strides under his leadership. He appreciated political realities and knew how to use them. The branch had not had such effective leadership since Campbell.

Coincident with Macdonald's assumption of leadership were the reorganization of the Vancouver Forest Products Laboratory and the enlargement of its staff and facilities. Finally freeing itself from its subordinate status to the Ottawa laboratory, it began functioning on a regional basis to serve the important west coast wood-using industries. The new arrangement required that the Ottawa and the Vancouver laboratories, as well as the Pulp and Paper Research Institute, located in Montreal, should function as separate organizations, reporting directly to the Dominion forester. To coordinate the work of the three establishments, the Forest Products Research Committee was set up. It comprised representatives of each laboratory and the Dominion forester as chairman. Meeting quarterly, the committee held its first session in February 1948.

In January 1948 the Forest Insect Control Board, which had functioned in the Department of Reconstruction and Supply, was transferred to Mines and Resources. Set up by order-in-council in September 1945, it was composed of forestry representatives of the Dominion, the provinces, and the forest industries. Although established primarily to fight the spruce budworm epidemic, it had expanded into the broad field of forest insects and had succeeded in increasing the interest and support of the provinces.

The forest service undertook to survey the forest resources on Canada's Indian reserves. Arthur Bickerstaff, who was responsible for the operation, described what was involved:

> "Sometime around 1947 or '48 there were overtures made to the Dominion Forest Service to do something on Indian reserves in Canada. . . . Since I had previously been concerned with preparing management plans and surveys . . . on experiment stations . . . I had a strong interest and involvement on the Indian reserves and requested that assignment and got it. The job was to look into the state of forest management on Indian reserves in Canada, particularly eastern Canada, and come up with some proposals as to what might be done. . . .
>
> ". . . My way of making an appraisal of some of the reserves was, for example, to have an Indian with a motorboat or a canoe . . . go with me, and I would take whatever aerial photographs were available and I would say, 'Drop me off on this point here and pick me up two hours later over on this point.' . . . I would show him on the photograph . . . and I would walk through it and see what it looked like. After spending two or three days on the reserve, I would say that I think, . . . all in all, the areas that have timber average about eight cords per acre overall, that 70 percent of it is poplar and another 20 percent spruce and balsam, and in the remaining 10 percent miscellaneous other conifers. I would then multiply it by the approximate area and that was the value of it, and I would also have a rough history of the logging and fire on it. . . .
>
> "What happened was, looking into the situation on Indian reserves, how they were going to be managed, you did have to have some kind of a quick inventory . . . and we did set up a system so that they were covered over a period of three or four years in Ontario, and this program was later extended to other provinces. For all of the surveys very simple management plans were drawn up indicating what might be cut first and what cut, if any, the reserve might sustain, or what other uses beyond the timber harvest might be made of the reserve. This was quite a revelation to Indian Affairs because . . . some of the reserves

had not been visited by Indian agents in a very considerable number of years. We found some rather unusual things going on and appropriate recommendations were made.

"For the future management of these reserves, there were two options available. One was that the Dominion Forest Service undertake the management of the reserves; that is, prepare management plans, supervise the cutting and so forth. The other was that this be done by the Indian Affairs Department. My recommendation was that it be done by the Indian Affairs group with miscellaneous technical advice, when appropriate, from the Forestry Service, because under the administrative setup that existed, it did not seem feasible to me to have several different agencies exerting authority over the Indian reserves."

That year, 1947, the Forest Protection Division took on new staff, including J.C. Macleod, who would add his name to that of Wright and Beall as a leader in forest protection development. Field studies continued at the Kananaskis Forest Experiment Station and in 1947 the Wright system was introduced into Manitoba and made optional the following year in Ontario. The year 1948 also saw the establishment of a fire-hazard research station at the Whiteshell Forest Reserve (Whiteshell Provincial Park) in Manitoba, which would become a base for the main field work carried out by the division for some time thereafter.

The Eastern Rockies Forest Conservation Board was established in the autumn of 1947 under the authority of the Eastern Rocky Mountains Forest Conservation Act, passed by Parliament in July and ratified by Alberta in March 1948. Under this act and an appended agreement, an area of some 22 235 km$^2$ (8585 square miles) on the eastern slope of the Rocky Mountains in Alberta became the responsibility of the board for all

FIGURE 35. Arthur Bickerstaff. (National Film Board)

matters related to forest protection and development. These included the construction and maintenance of roads and other projects and facilities required to conserve the forests of the area and maintain the greatest possible flow of water in the Saskatchewan River in its tributaries. Because the waters on which Alberta, Saskatchewan, and Manitoba depend for power, irrigation, and domestic purposes rise on the eastern slope of the Rockies, it became a matter of national interest to assure the conservation and orderly development of the eastern slope areas that form the source of the eastward-flowing streams and rivers. Administration of the Dominion act fell to the minister of Mines and Resources.

The 1948 annual report of the Dominion Forest Service reflects the optimism of a growing and effective organization:

> "The Service can report a growing recognition by all concerned that the period of 'Mining' the country's forest resources is at an end, and that if the prosperity of the industry is to be maintained, a program of modern forest management on a sustained yield basis is essential. The increasing interest in this matter is evidenced by the various Royal Commissions set up in recent years to examine the forestry situation in British Columbia, Saskatchewan, and Ontario, and also by the adoption in March, 1948, of a 'Forest Policy' by the Canadian Pulp and Paper Association. This development will possibly require even greater attention to silvicultural and forest products research than has been given, and the demands for greatly extended research in all fields of forestry seem likely to increase."

This was the last anonymous report from the Dominion Forest Service. The following year would see some major changes and the emergence of the service from beneath the dark cloud that had hovered over it since the early thirties.

# 24. The Canada Forestry Act

The greatest of Macdonald's numerous achievements was the work that went into the framing of the Canada Forestry Act and the upgrading of the Dominion Forest Service to the status of a branch. Herbert W. Beall, who was charged with administering the programs that came out of the act, remembered that in the period before its framing "there were great comings and goings at the Director's office, and he was constantly in conference with the Deputy Minister, with whom he was on very good terms." The deputy minister was the brilliant H.L. Keenleyside, who shared Macdonald's views on forestry matters.

Macdonald had cogent arguments for justifying such an act: first, the service had been functioning without proper statutory authority since 1930; second, the Wallace Report. Beall summarized the position:

> "It begins before the transfer of natural resources administration to the provinces from the federal government in 1930. The statutory authority for the Dominion Forest Service was the Forest Reserves and Parks Act of 1927. After 1930 this had no practical application to the Dominion Forest Service, but it remained on the statute books to provide for the Forest Service's existence, even though this was now almost entirely in research, which wasn't covered by the Act at all. Thus there was a need to correct this anomalous situation. Also, from 1930 on, there was a . . . growing conviction . . . that any new Act that was made, to legalize properly the functions of the Forestry Service, should provide for federal financial aid to the provinces in the protection and development of their resources. This view came especially from the Prairie Provinces, which didn't want the management of the forest in the first place. When the transfer of the resources was made, what the provinces were interested in was mineral resources, and I believe the government of the day under Mr. Mackenzie King said that 'if you get the mines you're going to get the whole works: you'll take the forests too,' even though the forests were a very minor source of revenue and, in fact, were a sizable charge on the federal purse because of the need to protect and maintain them . . . the provinces didn't have enough funds to manage them properly. Certainly I think it is quite fair to say that standards of forest management, especially fire control, declined very markedly in the three Prairie Provinces after the federal government got out of that field."

Then, of course, the Wallace Report provided a whole battery of arguments and reasons for an enlightened Canada Forestry Act. A combination of outside pressure and the need for international housekeeping provided the background to the act. Then there was Macdonald. Among forestry veterans there is a tendancy to compare Macdonald with Finlayson rather than with the mild-mannered Stewart, Campbell, or even the cool and collected Cameron; and, superficially, the comparison is valid. Both were fighters; both were rough and tough foresters. But Macdonald had a flair for getting along well with the people who could help the service. Nobody was there to help Finalyson and the service in 1930. Herbert Beall gave an example of Macdonald's wily tactics:

> "I accompanied him to meet a number of very senior officers of the Department of National Defence at the time that Camp Gagetown was being established, just at the time that areas were being expropriated from local landowners in New Brunswick to set up the

camp. It seemed that National Defence had pretty well decided that they would set up a sort of forestry corps such as existed during the war, to look after forest management and fire protection among other things on the camp area. However, they did think that they should consult the federal forest authority concerned with those things at the time. So Macdonald was asked to have a talk with them, and I went along with him. Don, I remember, began the talk by saying that he thought it would be a wonderful thing to have a forestry corps setup in the Army. Then he went on to point out certain disadvantages, problems that they would meet, things they would have to do, and indicated that the Forestry Branch had had experience in all these things, and perhaps knew the answers, and so on. You know, if they really wanted the Forestry Branch to look after this sort of thing at Camp Gagetown, well, just possibly, the Forestry Branch might consider doing it. By the time this hour or so was up, the military gentlemen were really imploring the Forestry Branch to take over all the forestry activities there. Which, of course, was what Macdonald had in mind and wanted exactly in the first place. And his tactics in bringing it up were really very very good, and he did this on many other occasions. He was a good strategist and tactician. . . ."

Macdonald was more than a good strategist or tactician. He understood the possible future role of the forest service as well as either Stewart or Campbell, as revealed by the terms of the Canada Forestry Act, which was drawn up by the Justice Department in close consultation with Macdonald.

The act, described as "An Act Respecting Forest Conservation," received Royal Assent on December 10, 1949, and consisted of 11 clauses. The first clause stated simply that "this Act may be cited as The Canada Forestry Act." The second clause defined "forest protection" as protection against fire, insects, and disease; and "forest experiment" as the study of, and experiment and demonstration in, forest management, silviculture, forest pathology, forest entomology, and forest fire protection. The third clause provided broad powers to establish national forest or forest experimental areas on any lands belonging to the federal authority, and to add to or withdraw lands from any such areas. The fourth clause covered the role of the forest products laboratories "for the better utilization of forest products and may assist any province or forest owner in the protection and development of forest lands. . . ." The fifth clause gave the minister power to, "within National Forest and Forest Experimental Areas, do such acts and construct such works as may be necessary for forest protection and forest experiment." The sixth clause was crucial, for it opened up an operational role for the service on a national scale that, properly developed, could produce for the first time a genuine national forestry policy, the much-sought-after goal of every director since Stewart. It consisted of three subclauses. The minister was empowered to:

a) with the consent of the governor-in-council enter into agreements with any province for the protection, development, or utilization of forest resources, including protection from fire, insects, and disease, forest inventories, silviculture research, watershed protection, reforestation, forestry publicity and education, construction of roads, and improvement of streams in forest areas, improvement of growing conditions, and management of forests for continuous production;

b) enter into arrangements with other departments or agencies of the Government of Canada for carrying out the provisions of this act; and

c) enter into agreements with any persons providing for economic studies of forest resources or forest industries, forest research and demonstrations, and the operation of forest products laboratories.

The first subclause (a) made possible for the first time the establishment of national norms in forest inventories, a single uniform method of compiling such inventories so that the individual provincial figures could be related to provide an overall estimate of the total resource. The establishment of a national forestry policy and the fate of the forest service would hinge on the realization of this goal. The second and third subclauses (b and c) enabled the service to establish its claim to leadership in forestry by setting high standards in each field.

The seventh clause covered the range of regulations that could be made for national forests and forest experimental areas; the eighth indicated the source of revenue for expenditures; the ninth established penalties for violation of regulations; the tenth outlined the legal basis for proceeding against violation; and the final clause repealed the long-out-of-date Dominion Forest Reserves and Parks Act of 1927.

The Canada Forestry Act provided the forest service with its long-awaited opportunity to prove to the government, the skeptical provinces, the forest industries, and the people of Canada that it had a meaningful national role to perform in the conservation and development of the country's single most valuable renewable natural resource. This was Macdonald's great achievement. It now remains to be seen how well the service exploited its golden opportunity.

# 25. Emancipation

The year 1950 marked the emergence of the forest service from the uncertainty and doubt that had surrounded it since it went underground in 1930, a restoration of the forest service's status, and an official recognition of its importance to the national economy. Macdonald and the people around him may have been certain about the role of the service on the national scene, and his aggressive leadership certainly contributed to its emergence, but in the government structure, the service was not a priority for Treasury Board when it determined the federal budget annually.

L. Sayn-Wittgenstein, at that time a forest research officer, wrote of the new development:

"The general economic expansion after World War II and the increased recognition of the value of natural resources was accompanied by a rise in the level of government activity. A consequence of this was the breaking-up in 1950 of the Department of Mines and Resources and the Department of Reconstruction and the formation of several new departments. One of these was the Department of Resources and Development that was to include the Dominion Forest Service. The Dominion Forest Service once again became the Forestry Branch, one of the main branches of the new department. . . . The branch was divided into three divisions: Research, Operations, and Forest Products Laboratories. This first subdivision was primarily according to function.

"The Research Division contained three sections: silviculture and management, inventories, and fire protection. The Operations Division included four sections, namely (1) the Provincial Agreements Section, (2) the Education Section, that was concerned with the preparation and distribution of educational literature, (3) the National Parks and Northern Administration Section that was to advise and assist other government agencies in forestry matters relating to the national parks and to the Territories, and finally (4) the Indian Reserves Section that was to advise and assist in forestry matters on Indian reserves. This section carried out forest surveys on Indian reserves, while one of its foresters assisted the Indian Affairs Branch of the Department of Citizenship and Immigration in the administration of timber on Indian reserves near North Bay. The organization of the Forest Products Laboratories continued with the primary divisions into the Ottawa and the Vancouver Laboratories."

Macdonald, signing the first annual report of a director of forestry since that of Finlayson (1936), noted that the fiscal year completed 50 years of activity by the federal forestry service. In all fields of forestry, including fire protection, tree planting, the operation of national forests, and forestry and forest products research, he boasted it had pioneered and provided leadership throughout Canada.

For the first 30 years of its history, the service had been concerned mainly with the administration and protection of some 88 000 km$^2$ (34 000 square miles) of national forests in the four western provinces, including the east slope of the Rockies, but it had recognized the need for scientific management of the forests as early as 1917, when it initiated a forest research program at the Petawawa Forest Experiment Station. In 1922 it had absorbed all the forestry functions of the Commission of Conservation. Consequently, when the natural resources were transferred to the jurisdiction of the four western provinces, in 1930, a substantial foundation had already been laid for research, both fundamental and applied, and this now constituted the chief function of the Forestry Branch.

Reviewing forestry developments in Canada over the preceding 50 years, Macdonald observed certain broad trends. There was definite evidence of a transition from an attitude of forest exploitation to one of forest conservation, and the recognition of the need for the application of science to forestry problems. Professional forestry had been firmly established and recognized as the backbone and directing force in the development of sound forestry practice. The importance of the professional forester was evidenced by the increasing demand for his services, not only by governments but by the forest industries, whose enormous growth and development were a significant factor in the national economy and the external trade of the country. Finally, the importance of forest wealth and the vital role the forests played in times of national emergency had at last awakened public consciousness to the need for protecting and conserving this great Canadian asset. All these factors, presumably, had helped to restore the respectability of the service.

Macdonald pointed out that the federal forestry service had contributed substantially to forestry development in Canada over the preceding 50 years, and that its future role would be no less important, particularly because of the new Canada Forestry Act: "This legislation can be of the greatest significance to Canada by reason of the fact that it provides a statutory basis for an over-all national forest policy to be worked out in co-operation with the provincial governments and the forest industries." Neither Macdonald nor his successor, J.D.B. Harrison, would live to see the realization of that goal.

There had been several changes in branch organization, including the opening of an office in May 1950 at St. John's, Newfoundland, with D.E. Nickerson as district officer-in-charge. The Forest Insect Control Board, originally attached in an advisory capacity to the minister of Reconstruction, had been transferred in May 1950 to act in the same capacity for the minister of Resources and Development. On December 13, 1950, George Tunstell, chief of the Forest Research Division, was appointed a member and acting chairman of the Eastern Rockies Forest Conservation Board; and in January 1951, after 5 years with FAO, J.D.B. Harrison returned to the branch as assistant chief of the Forest Research Division.

The 1952 annual report of the Department of Resources and Development listed D.A. Macdonald as director of the Forestry Branch, George Tunstell as assistant director, J.D.B. Harrison as chief of the Forest Research Division, H.W. Beall as chief of the Forestry Operations Division, and J.H. Jenkins as chief of the Forest Products Laboratories Division. The outstanding news that year was the Canada Forestry Act:

> "The most important development in the Forestry Branch, and one of great significance to forestry in Canada, was the implementation of the Canada Forestry Act on April 1, 1951. As a result federal financial assistance is now available to any provinces for forestry inventory and reforestation of unoccupied Crown lands. Federal–provincial agreements were signed with seven provinces, whereby each of the latter undertook to complete an inventory of its forest resources in the next five years, for which the Federal Government will pay 50 per cent of the cost. Four provinces signed agreements for assistance in reforestation, whereby the Federal Government will pay one-fifth of the cost of the establishment of new forest tree nurseries and one-fifth of the gross expenditure incurred in planting unoccupied Crown lands. While all provinces had made considerable progress in the preparation of their forest inventories, there is no doubt that the federal assistance

granted under the Act has given a much-needed stimulus for the completion of these inventories within a specified time and on a scale to reveal the true picture of the extent and nature of this important resource both on a provincial and a national basis. Federal assistance in reforestation has also increased interest in this important phase of forestry in Canada."

Harrison recalled the impact of the act on forest management practice:

"I was not in the country when the Canada Forestry Act was established, but it did make it possible for Canada, without interfering with the administrative rights of the provinces over their own resources, to give financial assistance for certain defined activities. Notably these were forest inventories, the purchase of fire-fighting equipment but not participation in fire-fighting costs. There was some help given in connection with plantations. . . . Perhaps its most important contribution was the promotion of a more-or-less uniform inventory of the forest resources of the country. . . . Before the first meeting of the provincial authorities was held about inventories, we set down a list, I think it was a page and a half, of requirements for an inventory to which we would contribute money; photographic scale, for instance, map scales, maps, two sets of scales; the use of random sampling where it was possible, or systematic sampling of an acceptable nature. And this was accepted. Those sheets, I don't think, were ever changed, and they were followed out very well. There was no difficulty. . . ."

Harrison's opinion was not shared by all members of the branch. In 1970 Dr. T.G. Honer as chief, Productivity Program, Forest Management Institute, commented:

"The level of intensity of the inventory was never specified in statistical terms. For example, the probability levels and the minimum confidence intervals about the mean volume estimate were never specified, even though the Forestry Branch had been using and advocating statistical methods since the days of Wright. This was probably due to the fact that the inventories the provinces were capable of undertaking were rather elementary in design. Systematic sampling schemes were generally in vogue on the industrial timber limits, but at that time statistical techniques to handle such systems had not been developed.

"Within a province, merchantable utilization limits in terms of stump height and top diameter were pretty well standard for pulp or sawlog material, but between provinces these limits varied greatly. Most provinces in the East also reported merchantable cubic foot volume for trees having a diameter at breast height of 5 inches and larger. In British Columbia this has never been done, and even today when figures are submitted for the national forest inventory, reports are presented only in terms of mature merchantable volume. Volumes of young immature forests and those sizes common to eastern Canada are not given.

"The Forestry Branch failed to provide suitable definitions to accompany the so-called standards. Later, the funding of the inventory was associated with the acreage in 'accessible forest land' — land accessible for harvesting and capable of growing or supporting a forest crop. As a result, in one western province, all inaccessible forest land disappeared overnight.This led to many discussions regarding revisions to the inventory standards."

Honer then recalled that at a conference of federal and provincial authorities held in June 1929, a countrywide survey of forest conditions was launched. The objective was to obtain an estimate of the average stocking in the various subdivisions of the forests of Canada, the rate of growth under each of these subdivisions, and the nature and conditions of reproduction and small growth. Plans for the national forest inventory required that representative and comparable figures on growth should be made available for the different forest regions and types in Canada, within a relatively short time. Thus data were collected to make possible statements of volume, growth, and reproduction for each province, and for each important watershed examined. Reports for each province and Newfoundland were completed, published, and later summarized by R.H. Candy.

The survey was not without criticism. Perhaps the greatest conflict involved technical details regarding survey conduct and the analysis of survey results. Honer wrote:

> "The problems confronting the survey concerned sampling and mortality determination. Sampling was carried out within 'representative' blocks and the resulting area figures reflected the bias of block selection. Ten year mortality figures were based on the subjective judgement of the cruiser. Thus the chances of having biased volume and growth estimates were high, and inferences concerning watershed, growth regions and provincial estimates were probably in error. However, for the period they were the best and only source of growth and yield information available.
>
> "These difficulties began in 1931 . . . and continued to 1945 without being completely resolved. On January 8, 1946, a meeting of Forestry Branch executives was held to consider the problems associated with forest growth. As a result of the meeting, future work was devoted to the development of technique. The Forestry Branch never again attempted the large scale rate of growth survey on a national basis. Investigations were limited to remeasurement of existing projects and the development of yield tables and yield table techniques; a policy advocated in 1932 by the survey critics.
>
> "J.D.B. Harrison was the major critic and he maintained his opposition to 1946, when he was able to convince Cameron that they should be scrapped. By establishing a policy for growth and yield of research and development of technique only, Harrison effectively closed the door on a Canadian Forestry Service operational role in Canadian forestry. Canadian forestry statistics have suffered severely since that time.
>
> "The demise of the rate of growth survey coincided with the beginning of federal–provincial shared-cost programs in forest inventory arising out of the Canada Forestry Act. Initially these inventories were to meet specified federal standards so that national statistics would result. However, the provinces generally conducted surveys to their own standards, and confidence in the resulting national forest statistics weakened."

Honer characterized Harrison's interpretation of the Canada Forestry Act as "extremely narrow, probably conditioned by the 1930 experience and his reluctance to have the Canadian Forestry Service undertake an operational role in forest survey." Yet, Harrison at FAO in 1950, just before his return to the federal forestry service, stated:

> "Without knowledge of the extent and nature of the forests, management is clearly impossible. It is this knowledge which a forest inventory must provide. At the national level it will furnish the facts required for the formulation of a constructive forest policy and a general plan for development."

Harrison's tunnel vision in this one respect would eventually prove to be the undoing of all his later brilliant achievements. He enjoyed Macdonald's confidence, and forest statistics was his special sphere of competence. The Wallace Report had particularly urged rate-of-growth surveys; the Canada Forestry Act provided the statutory basis for launching these and other surveys; and Seely had developed a unique method that would enable the Forestry Branch to establish an unquestioned leadership in the field. But it called for an operational role, and at this crucial stage the branch leadership failed to seize the opportunity to play it. Having been burned so badly by the 1930 debacle, perhaps the Forestry Branch leadership refused to take further risks in that field.

Just as Finlayson had been obsessed with the activities and problems of administration and had neglected research, it seemed now as though his successors would repeat his mistake in the opposite direction. However, this missed challenge was not clear at that time. The mood was optimistic, for the branch had its own powerful act, and a period of fruitful work lay ahead.

# 26. New Growth

The new surge of activity was reflected in the branch's 1952 report, which noted that the drain on Canada's forests, including losses from forest fires, insects, and disease, amounted to 121 800 m$^3$ (4.3 million ft$^3$). Of this total, 99 100 m$^3$ (3.5 million ft$^3$) were cut for use, an amount almost 20% greater than the average for the previous 10 years. Clearly, there was a need and a role for a national forestry presence.

Since the implementation of certain phases of the Canada Forestry Act in 1951, several administrative functions had been added to the responsibilities of the branch. After 3 years of operation the agreements between the federal government and eight provincial governments regarding forest inventory and reforestation were functioning satisfactorily. Seven provinces were receiving federal financial assistance for the completion of their forest inventories; six provinces were receiving financial aid for reforestation. The area planted or seeded to date amounted to almost 14 973 ha (37 000 acres) and involved the planting of some 30 million trees. Under forest inventory agreements, about two-thirds of the work had been completed in the provinces cooperating in this field.

An arrangement between the Department of Northern Affairs and National Resources and the Department of National Defence made the Forestry Branch responsible, on January 1, 1954, for the protection and management of the forests in the Gagetown military area. This was a new function for the branch. The Gagetown area occupied 1114 km$^2$ (430 square miles) in New Brunswick.

Plans were also formulated to ensure concentration of research on the most important problems. Projects in both fundamental and applied forest research were directed according to a forest research policy adopted in 1953. The work was conducted by three head office sections, concerned respectively with silviculture and management, forest inventories research, and forest fire protection research; and five district offices located at Calagary, Winnipeg, Valcartier, Fredericton, St. John's; and the Ontario research unit at Ottawa.

This new approach involved 5-year objectives for each problem, expressed either in terms of specific goals or amount of research to be accomplished within the period. Obviously, objectives were necessarily limited by the size of the staff available in each area and the special capabilities of the available research workers. About 80% of the working time of the staff was directed towards specific goals; the rest of the time was reserved to meet unforeseen research requests.

The mid-fifties was a period of optimism and growth. Construction began on a new forest research laboratory at the Petawawa Forest Experiment Station, and plans were prepared for new forest products laboratories in Ottawa and Vancouver, and for a new laboratory to be operated by the Pulp and Paper Research Institute of Canada at Pointe Claire, Quebec. Provision of these long overdue and badly needed new laboratories would accelerate progress in the forest and forest products research program conducted by the branch and by the Pulp and Paper Research Institute of Canada. They were concrete recognition of the importance of the forests and forest industries in the Canadian economy and the significant part that research must play in their future development. It was at this point, in 1956, that D.A. Macdonald retired. His regime had been one of growth and accomplishment.

The fiscal year 1956–57 saw a change both in the leadership of the branch and in the department itself. J.D.B Harrison became director of the Forestry Branch; his former post of chief of the Forest Research Division was unfilled. The Hon. Jean Lesage was still minister of the Department of Northern Affairs and National Resources. By September 1, 1957, Dr. Redmond was chief of the Forest Research Division, and the Hon. Alvin Hamilton was the new minister. The Conservatives under Diefenbaker had finally ended the long Liberal reign.

The 1958 annual report of the Department of Northern Affairs and National Resources featured an article entitled "Our Forests — Riches that Grow." It defined the role of the federal government:

> "In general, the role of the Federal Government, as authorized by the Canada Forestry Act of 1949, is to maintain forest experiment stations and forest products laboratories and to provide financial assistance to the provinces to enable them to improve the management of their forests. Federal assistance to provincial governments in recent years has been provided in forest protection, forest inventories and reforestation, and in the building of forest access roads."

It stated that the forest resources in Canada were probably our most important renewable asset. Deliberate planning and control were required to achieve the fundamental objective of maximum production in perpetuity, to balance cut with growth, and, in cutting, to make the most effective use of the forest, allowing for a future growing stock at least as

FIGURE 36. Aerial view of the Petawawa National Forestry Institute, Chalk River, Ontario.

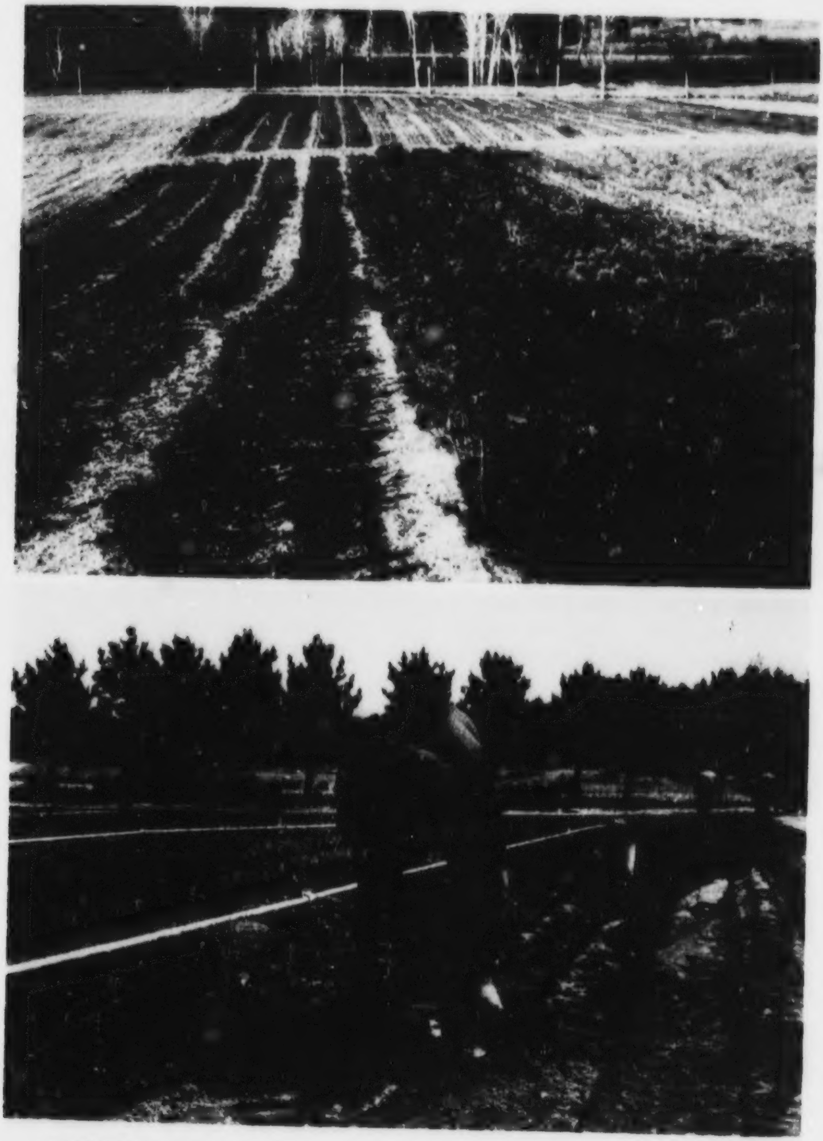


FIGURE 37. Bare-root nursery beds, Petawawa National Forestry Institute.
(Photos by John Veen)

valuable as that removed. The greatest threat to this was fire and, after fire, the effects of insects and disease. Then there was the more positive problem of increasing the forest yield through the science of silviculture.

The application of silviculture and improved utilization practices to forestry was not a new concept: it had been applied in Europe for more than two centuries. But it was not until the twenties that forest inventories were underway in most provinces, putting the authorities in a much more favorable position to establish realistic control measures and regulations to relate drain to existing supply. The relation of drain to growth potential, a more far-reaching concept, led to the formulation of the present system of working plans and systematic forest management. Working plans, including the long-range and short-term cutting plans for large forest properties, were required now by provincial forest authorities and had to be approved before cutting rights were granted to the lessee or licensee. In some instances the lessee was also required to make provision for satisfactory regeneration after his cutting operation and could obtain seedlings from both provincial and federal authorities.

Assuring the new stand was only one of the objectives of silviculture. Just as important was the need to increase the yields from the forest, in both quantity and quality. Solutions had to be found to the problems of using species hitherto ignored and of increasing the uses made of both traditional and new species.

Research in forestry and forest products, directed towards solving these problems, had been carried out in Canada for more than 40 years, but since World War II these research programs in silviculture, forest management, and forest products, together with their economic application, had been greatly expanded by the federal Forestry Branch. Expansion also occurred in the work being carried out by the Science Service of the federal Department of Agriculture in forest entomology and forest pathology. Provincial governments and some of the forest products industries were also increasing research.

The forests and forest industries contributed significantly to the economic well-being of the Canadian people. Woods operations alone employed 7% of the work force and accounted for 17% of the net value of production of all Canadian manufacturing. As a source of foreign exchange, the forest industries led all other industrial groups.

In its last year as part of the Department of Northern Affairs and National Resources, the fiscal year 1959–60, the branch staff numbered 484 and its appropriation amounted to $6.2 million. The branch was then formed into three parts: the Research Division, the Operations Division, and the forest products laboratories. In addition there were two separate sections, Forest Economics and Administration, that were directly responsible to the director. The divisions were organized according to function: the Research Division conducted investigations into both practical and basic problems in the various fields of silviculture, forest management, fire protection, and forest inventories; the Operations Division was primarily responsible for the administration of agreements made and projects undertaken under the authority of the Canada Forestry Act and also assisted in surveys of forest lands under federal administration; the forest products laboratories investigated the properties of wood and the problems connected with logging and utilization.

The activities of the Research Division were highly decentralized. Its headquarters was in Ottawa, and it was headed by a division chief and an assistant chief, assisted by three forestry officers. Headquarters also contained the offices of the Fire Protection Section, the Forest Inventories Section, and the Ontario District Office. The remaining six district officers of the division were scattered across Canada at St. John's, Fredericton, Valcartier, Winnipeg, Calgary, and Victoria. (Macdonald's departure and the consequent termination of that lengthy feud with Dr. Orchard, deputy minister of Lands and Forests for British Columbia, that had started with Finlayson paved the way for the opening of the Victoria District Office.)

Forest experiment stations were subordinated to the various district officers, except for the Petawawa Forest Experiment Station, which enjoyed more independence. This station, where most of the basic research in ecology, genetics, taxonomy, and physiology was conducted, was probably the most important forest research center in Canada. The district offices were concerned mainly with research in applied silviculture. They were decentralized because silviculture is an empirical science yielding results that can rarely be accepted without further investigation for forests growing under different conditions. The service distributed its district offices and experimental stations so that all the important forest regions of Canada were covered.

Such was the structure and function of the Forestry Branch in early 1960. By the end of that year, all would be changed. L. Sayn-Wittgenstein described the situation aptly:

> "Departmental reorganizations occurred frequently during the last decades in the history of the Forestry Branch. A departmental tradition or a long-accepted order that might have presented obstacles to further changes were therefore never present. Furthermore, the end product of all these reorganizations, the Department of Northern Affairs and National Resources, does not appear to have been an improvement over the preceding departments, for it was a large agglomeration of often almost entirely unrelated organizations. . . . Its name was misleading. It was only one of several departments that played important roles in the north and it had no control over such important natural resources as agriculture and mining.
>
> "Because of the frequency with which changes in organization had taken place in the past and because there was no evidence that the Forestry Branch had found its ideal place in the organization of the Government of Canada, it is not surprising that the Forestry Branch was soon to find itself in the midst of another reorganization. This time, however, it was to emerge as an independent government department."

## 27. The Science Service

Forest entomology and forest pathology in the immediate post-World War II period grew rapidly. Entomological research more than doubled in the decade following the war, occurring largely in the federal Department of Agriculture, which in 1956 employed more than 350 full-time professional entomologists and conducted at least 85% of the entomological investigations carried out in Canada. The same phenomenon occurred in forest pathology. In 1941, there were only four trained forest pathologists in the Canadian government service; by 1955 the number had increased to 40. The expansion was attributed to several calamities affecting forest areas and an awakened public interest in the importance of the forests to the national economy. As a program of surveys and field and laboratory research developed, it became apparent that more effective work could be accomplished through coordination of effort.

In recognition of this principle, the Forest Biology Division was formed in January 1951, within the Science Service of the Department of Agriculture. The components were the unit of forest entomology from the Entomology Division and the unit of forest pathology from the Botany and Plant Pathology Division. At that time there were four regional forest pathology laboratories, located at Fredericton, Toronto, Saskatoon, and Victoria. In 1952, laboratories were established at Quebec, by transferring a small staff from the Quebec government to the Canadian government service, and at Calgary. A seventh laboratory was opened at Corner Brook, Newfoundland, in 1956.

The Science Service of the Department of Agriculture had been established as a separate unit in 1938, when five existing divisions were combined. In 1942, a sixth, the Plant Protection Division, was added. It was not until 1944 that it was able to publish its own separate annual report, excerpted from the annual report of the minister of Agriculture. At that time J.M. Swaine was still director, and H.T. Gussow was serving his last year as associate director. Gussow was superannuated on February 24, 1945, and was succeeded by J.H. Craigie.

At this point in the history of the Science Service, the problems of forestry seem to have had low priority for they were not mentioned specifically in the preamble of the annual report. However, it was noted that forest pathologists had investigated the buoyancy of pulpwood bolts, that studies of certain wood-destroying fungi had been completed, and that forest pathologists on the Queen Charlotte Islands, British Columbia, were assisting in the selection of spruce for airplane production. It was also noted that special surveys assisted the lumbering and pulp and paper industries in planning the salvage of timber damaged by the spruce budworm. Assistance rendered the birch veneer and plywood industry by special surveys of trees damaged by the bronze birch borer allowed orderly salvaging of the damaged trees and stabilization of the flow of supplies. The forest industries of Manitoba and Saskatchewan were assisted in the salvaging of forest-damaged timber by studies of the rate of deterioration in the bush. A serious bark beetle infestation in Banff National Park was controlled by sanitation cutting carried on in cooperation with the National Parks Bureau and the Department of Mines and Resources. A source of supply of a spruce budworm parasite, *Phytodietus fumiferanae*, which does not occur in eastern Canada, was found in British Columbia. This parasite would be brought to the East in 1945 and liberated in the forests to control the budworm.

Dr. R.E. Balch talked about the developments in forest pathology and entomology at that time. He recalled the circumstances of the Green River Project, which was a landmark in federal–provincial–industry cooperation:

"... about 1948, ... I felt that we were about due for another spruce budworm outbreak in New Brunswick, and it was my intention to try and point out to the industry that it would be advisable to direct their operations into the more susceptible parts of the province. So we made a study of the aerial photographs and prepared a map which purported to show where the outbreaks would originate, where it would do the most damage. ... A suggestion was made at a meeting of the Entomology Committee of the Pulp and Paper Association in Montreal that it was about time to find out something more about the possibilities of controlling the budworm damage by management processes. ...

"The Fraser Companies ... offered their Green River area in northern New Brunswick for this work and de Gryse asked me to organize it, and eventually we got enough money to build what seemed to us, in those days, a very substantial laboratory. The whole project was a cooperative one, between the Forest Biology Division, the Company, and the federal and provincial foresters, and we had a work committee in which a representative came from each of these organizations. We used to have some hot arguments, but this was the beginning of some kind of understanding between entomologists and foresters.

"I suppose it was the first time they actually got together to plan a joint project of study. It included not only studies of insects, but also pathology and silviculture and management. ... The question was: How were spruce budworm populations affected by stand attacks, stand age, the whole complex of natural factors; which of these were key factors; and what could be done to improve natural control by creating more resistant or less susceptible forests? As for the benefits, I would say that the first benefit was that it actually brought entomologists and foresters together. In fact, I have sometimes said that anything that could do this, any insect that could bring about this understanding between foresters and entomologists, should be classified as a beneficial insect, and I would like to put up a statue at Green River for that purpose.

"Another benefit ... was to improve our understanding of the relation between outbreaks and the forest conditions, ... species composition, the effects of silviculture practices and management on the susceptibility of the forest as well as on its growth and regeneration. I think it helped to demonstrate, put on a more scientific basis, the necessity

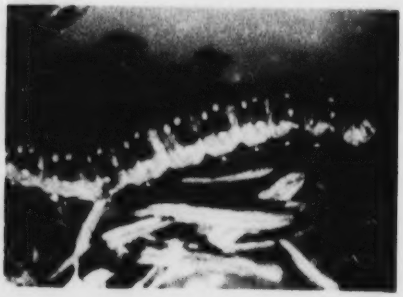


FIGURE 38. Spruce budworm larva. (Forestry Canada — Maritimes)

for managing balsam fir on a short rotation, avoiding large areas of clear-cut, and creating a proper distribution of age classes. In other words, good silviculture is good insect protection, not only from the spruce budworm but from any other species.

"It was in 1951 that the International Paper Company, under the stimulus of Barney Flieger, decided that they had to do something about the budworm outbreak that was on us. And I went to Montreal to discuss it with them and said that I thought it would be a good idea to try it. I didn't know what would be the results, and we would undertake to give what best advice we could and study the results as thoroughly as possible. And in '52 they undertook to spray 200 square miles. This was something very new, but we had DDT, which is a marvelous insecticide, and that operation was carried out so carefully. We put out little squares of paper to see where the spray missed and, if it missed, they went back and resprayed it. They used a pound to the acre and you could hardly find a budworm. It was 99 per cent control.

"We had the company urge the fish biologists to step in and study these possibilities of side effects and also their own pathologists, and they did, in a somewhat halfhearted way, but I must admit that we were not as aware at that time as perhaps we should have been of the possible dangers of DDT as such a persistent insecticide. . . ."

On April 28, 1953, the federal government entered into an agreement with the government of New Brunswick, providing for federal financial participation in a greatly expanded program of aerial spraying. Thus began one of the most remarkable peacetime aerial operations in Canadian history.

When the Forest Biology Division was created in the Science Service of the Department of Agriculture in 1951, Malcolm L. Prebble was appointed its first chief. Born in Saint John, New Brunswick, in 1909, Prebble graduated from the University of New Brunswick in 1930 in forestry, acquired a master's degree in entomology in 1932 and a Ph.D. in 1940 while working for the Department of Agriculture for 8 years.

From almost the start of his career, Prebble was associated with federal entomology. He served in the Maritime provinces and in British Columbia establishing a small laboratory in Victoria. In 1945 he was transferred to Ontario to take charge of the newly opened Forest Insect Laboratory, a joint venture of the federal Department of Agriculture and the Ontario Department of Lands and Forests. He remained at Sault Ste. Marie for 7 years and then, in 1952, was transferred to Ottawa to succeed de Gryse in what was then to be known as the Forest Biology Division, combining the forest insect investigation with the forest pathology investigation. This arrangement would continue until 1960, when the Department of Forestry was formed and the Forest Biology Division became the Forest Entomology and Pathology Branch in that department.

Prebble talked about the state of forest entomology:

". . . Forest entomology began to come into its own . . . in the very late forties and throughout most of the fifties. The quality of investigations . . . was very greatly increased at that time compared with the thirties and early forties, partly due to improved facilities, partly due to more staff and more support.

"I don't know if that necessarily represents a peak of forest entomology or even forest biology in Canada, because, at that time, any of the projects that were under way were, in a sense, approached from only the point of view of the entomological subject involved . . . . I

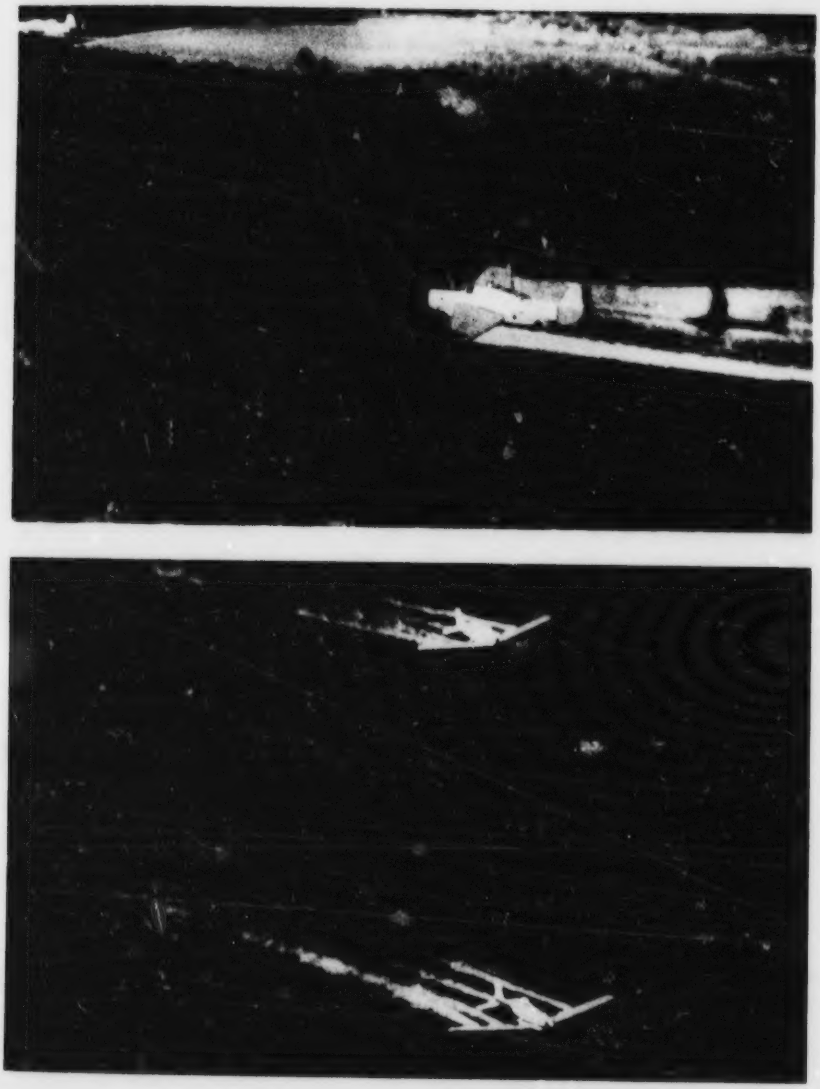


FIGURE 39. Spraying the eastern forest against spruce budworm. (Forestry Canada — Maritimes)

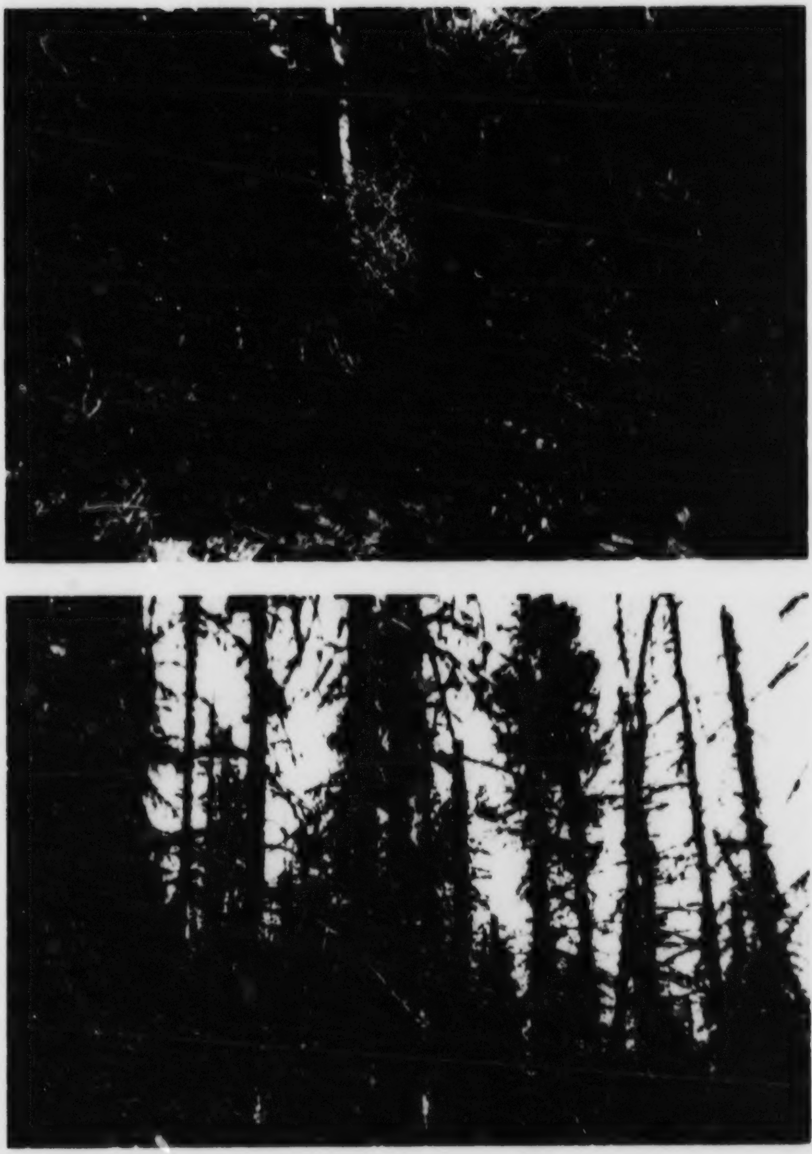


FIGURE 40. Eastern forests devastated by spruce budworm. (Forestry Canada — Maritimes)

think that the real change that has occurred . . . from the late fifties or early sixties through to 1972 is in putting the forest entomological investigations more fully into an overall forestry context, so that it plays its full part in problem analysis, incorporating the entomological studies with silviculture and mensuration, physiology, ecology, and so on. . . ."

Prebble commented on the Forest Insect Control Board:

"The Board was formed and set up before I had any real contact with it, but it is my understanding that the serious outbreaks of the spruce budworm in Ontario, and particularly in the Lakehead area of Ontario, were a cause of great concern to the industry. Having seen many hundred and thousands of square miles infested, and some of them already beginning to die in the Algoma district, they felt that the industry needed a much more effective program of insect control. . . . I believe that C.D. Howe was representing Thunder Bay in the federal Parliament, and he was a very powerful minister, as you undoubtedly know. He was approached by the industry in the Lakehead area to set in motion something that would lead to more effective application of the results of entomological research in Canada, and the Forest Insect Control Board was set up as an agency to effect this. The Control Board had representatives from several provinces and several federal government departments. I believe the chairmanship first resided with . . . General Howard Kennedy, and he was a very powerful and forceful man in his own right. . . . Now, there was Mr. de Gryse sitting with that Board. He was able to persuade the Board that insect diseases were as yet an unexploited possibility for the control of some major outbreaks in Canada and he had, of course, the evidence of the collapse of the European spruce sawfly outbreak as a case to which he could point.

". . . I should say also that, in addition to the insect pathology work, . . . the Forest Insect Control Board was responsible, directly or indirectly, for the establishment of our specialized work in chemical control of forest insects and therefore might be regarded as a forerunner of the Chemical Control Research Institute, which has been in existence since the early fifties. . . . The spruce budworm has been the one problem that has dominated our interests. Once the large-scale control operations started in New Brunswick and in Quebec in the 1950's, many issues flowed from the use of chemicals, such as the wildlife interest, the fisheries interest, the share-cost agreements with provinces.

"More recently, of course, . . . there have been rather fascinating horizons opened up with the wildlife problems, and some of the land problems, and these relationships between lands, forestry and wildlife are beginning to unfold. . . ."

Dr. Prebble, without directly touching on the Forestry Branch feud with Dr. Orchard, deputy minister of Lands and Forests for British Columbia, which had prevented the Forestry Branch from opening a British Columbia district office, shed some light on the resolution of that impasse:

". . . The issue was first discussed in the days of the Forest Insect Control Board, which brought together the Director of the Forestry Branch (Macdonald) and the Deputy Minister of Lands and Forests for British Columbia, but no resolution came out of that. . . . As far as I know, the first critical discussions started in the mid or late fifties with

Dr. Kenneth Neatby, who was then Director of Science Service of the Department of Agriculture and the officer to whom I reported as Chief of the Forest Biology Division. On several occasions we had discussed the possibility of improving collaboration between the various . . . elements of the federal government, concerned with forest research, primarily in Agriculture and Northern Affairs. Dr. Neatby was an admirer of Dr. Orchard, then Deputy Minister of Lands and Forests of British Columbia, and I think he, in turn, was admired by Dr. Orchard. I was told that Dr. Neatby's aim was to encourage Dr. Orchard to be a little less possessive about forestry research in the province, and indicated to him that British Columbia would stand to benefit if there was a federal forestry research element in British Columbia, over and above that which was already there in forest entomology and forest pathology.

"I think the second or third time that this was introduced in discussion between Dr. Neatby and Dr. Orchard, they finally agreed, at which time the federal Forestry Branch established a unit in British Columbia, essentially to do work in tree physiology. British Columbia was still jealous over its proprietorship in connection with silviculture and other field aspects of forestry research. In any case, the first effort in British Columbia by the federal Forestry Branch in the late fifties and early sixties was in connection with physiology, and having established confidence, and getting to know one another better, it gradually enlarged to take in other aspects, including fire and certain silviculture programs. I would say the real difficulties had largely disappeared by 1965, and in the last few years . . . there has been excellent collaboration between all aspects of federal forestry research and the provincial research in the province of British Columbia. . . .

". . . Dr. Neatby was a commanding figure and I don't really think that his ability to influence people was limited to people in his own disciplinary field, which is essentially genetics, and he had a very wide appeal in talking with people and strict disciplinary limits were no obstacle to him in discussing fundamentals of our approaches to problems. I think it was on this basis that he was able to convince Dr. Orchard that British Columbia had everything to gain by encouraging better collaboration with the federal forestry people."

## 28. The Crest

On August 1, 1960, after the advice and consent of the Senate and the House of Commons of Canada, "An Act Respecting the Department of Forestry" received Royal Assent, and in October of the same year the Department of Forestry was established. The circumstances leading up to this momentous event in the history of the federal forestry service have been well documented.

Initially, hearings took place before the Standing Committee on Mines, Forests and Waters in 1958 and, more importantly, in May 1959, recorded in the minutes of that committee (nos. 20–26). Previously, both Harrison and J.H. Jenkins, who was then chief, Forest Products Laboratories Division, had established excellent communication with the forest industries, both in the East and in the West. When the 1959 hearings were held, all the important forest industries presented briefs and were represented by forceful spokesmen. Two points were common to most briefs: the federal government was drawing an enormous revenue from the forest industries ($200 million from pulp and paper alone) and spending a token amount in assistance ($10 million annually); they demanded more action by the federal government in forestry affairs. A joint submission of the nine leading British Columbia associations called for a more active federal research program. The same call came from the Woodlands Section of the Canadian Pulp and Paper Association. The Canadian Lumbermen's Association submitted a detailed program for expanded research by the forest products laboratories, which was warmly praised by most of the industry spokesmen because of the aid the laboratories had provided in the past, despite lack of adequate facilities and funds.

Harrison and Jenkins were present for most of the hearings, answered questions, and received sympathetic attention. They obviously had a rapport with the industry, and clearly the committee was impressed by the industry's complaints.

Undoubtedly the main factor was the personality of Alvin Hamilton, the minister responsible for forestry. A sharp, no-nonsense individual who sought the facts and then acted, he probably had a better appreciation of the federal role in forestry than any minister since Sifton. He attended several sessions, listened, and then awaited the committee's report.

The Committee on Mines, Forests and Waters reported on July 6, 1959. It brought down a strong report, repeating most of the demands contained in the testimony presented at the hearings and describing the Forestry Branch as a neglected organization, particularly considering the importance of the industries it served:

> "Your Committee submits that insufficient recognition has been given to our present dependence on the forest industries. Their well-being and that of the nation must count on a re-awakening of government to the needs of the various phases of these industries. The potential in this field for healthy, continued growth provides a challenge to all levels of government. Market and investment problems, scientific and technical requirements must all be met to sustain these industries and their balanced growth. In the past the forest industries have developed without assistance from the federal government. Today there are international markets and marketing problems which the industries cannot face alone. In contrast to mining and oil enterprises, these industries are harvesting a recurring crop which with care and good management does not deplete and can enlarge our natural resources."

The committee criticized the fact that full advantage had not been taken of the opportunities offered by the Canada Forestry Act. It stressed the need for improved liaison with industry and recommended the establishment of a National Forestry Development Advisory Board, advisory to the minister, with representatives from the federal and provincial governments and from industry.

Increased federal assistance in forest fire protection and prevention was recommended. Recognizing that forest administration was a provincial responsibility, the committee felt that federal assistance was justified in terms of the importance of forestry to the national economy. The federal government could help most by increasing its contributions towards the construction of forest access roads.

The committee made specific recommendations regarding administration, research, marketing, and taxation. The key administrative change recommended was that the Forestry Branch should have a deputy minister in direct charge. The fact that the Forestry Branch had not yet attained the status of a department reflected the government's lack of realization of the importance of the forest industries in Canada: "Other departments of government are considered essential to service industries or aspects of our national economy which are of much lesser economic consequence."

Concerning research activities, the committee recommended that forest entomology and pathology research, hitherto under the Department of Agriculture, be brought into the new department.

J.D.B. Harrison's version of events follows:

"Well, as you know, in 1958 Mr. Diefenbaker called a second election and obtained a very large majority. From the forestry point of view, the important thing was that he brought in Alvin Hamilton to be Minister of Northern Affairs and National Resources, in which the Forestry Branch found itself at the time. And the position of the Forestry Branch had been difficult. . . . The Forestry Branch didn't grow as fast as we felt that the demand for information required.

"This wasn't anybody's fault, really. When it came to supply of equipment, we had no kick whatever. On the other hand, the Forest Biology Division of Agriculture had been quite fortunate, and they were able to secure a lot of new laboratories . . . and quite a lot of men, and the net result was . . . that they had as many or more professional officers studying insects and tree diseases as we did for the . . . very broad field of forest research, which was, shall we say, anomalous.

"But when Alvin Hamiltion appeared on the scene — and he was a very remarkable man and still is — he had more ideas than any Minister I ever got in touch with. He had an intense interest in forestry. He didn't know anything about it, but he proposed to learn, and he wanted to see things jump, and he looked like a man that might be able to do us some good.

"So, we drew up a . . . staff development program for the next few years, which we sent to Hamilton, and he accepted it, and he also made some comments in the House of Commons that we were going to grow at such a rate, double our staff, and so on. But, meanwhile, other elements of government had begun to realize the anomaly of having part of forest research in Northern Affairs and the other part in Agriculture, and two things happened. . . .

"In 1958, a parliamentary committee for the first time discussed forestry and accepted briefs from the industry and from many sources . . . that showed very great interest. In 1959, it met again, and it submitted a very strong report suggesting that the Forestry Branch should be radically increased in . . . status. . . .

"The other thing that happened was the establishment of a committee under the chairmanship of Dr. Steacie, the then president of the National Research Council, between representatives of Northern Affairs and Agriculture, to see what could be done about unifying research programs, and this committee had several meetings.

"Dr. Prebble was head of the Forest Biology Division. Neither he nor I attended these meetings. They were at the Deputy Minister and Assistant Deputy Minister level, with the slight difference that the Agriculture people were professionals and Gordon Robertson and

FIGURE 41. Dr. J.D.B. Harrison, director of Forestry Branch 1956–60 and deputy minister of the Department of Forestry 1960–62. (Forestry Canada)

Ernest Côté were not but they held our end up very well. Certain ammunition papers were supplied and the committee . . . met several times and no agreement was reached and the matter was dropped as far as the committee was concerned.

". . . In mid-1959 Alvin Hamilton had thoroughly stirred things up. I received instructions on a Friday morning to prepare a submission to the Committee of Cabinet. This was to be an explanation of why more forest research was needed in Canada. . . . The rub was that it was to be ready by Wednesday night for the dry run with the Minister. There was not very much time, because it was a long weekend. . . . But a very elaborate set of charts was prepared and these were beautifully drawn, large-scale, colored, all done by hand, all very hush-hush. . . .

"The whole approach to this Committee was not to talk research; it was to talk economics. If we were going to hold our place in the world, we had to have the research. It was no good going and talking to them about silviculture and pathology and so forth. . . .

"Well, anyway, by Wednesday night, we had our dry run with the Minister. It was okayed and it went up before the Committee and this was really a doing. Hamilton was there; Walker, the Minister of Public Works, as Chairman. There was the odd question that I had to answer briefly at the end, but the presentation took two solid hours, and the attention was simply marvelous . . . it put me in full flight to have the Minister of Trade and Commerce suddenly say, 'What's ecology?' Well, what do you say? I told him it was the relationship between the organism and its environment, and it seemed to quieten things down, but, anyway, it went over extremely well. Then the chairman told me . . . they would think it over and I could leave the charts there for the time being, but they wanted me to come back and tell them explicitly, if they accepted the view that . . . more research was needed, why did the federal government have to do it?

"The simple reason was, of course, that there was nobody else in Canada to do it. Of the provinces, only four of them got any net revenue from the forests. This caused great astonishment among all concerned; only two of the provinces got substantial revenues. The others were spending more already on the forest than they were getting out of it.

". . . The chairman wanted to know why the enormously rich pulp and paper industry couldn't finance its own research with all the money they've got. Then I told him I understood that the Minister of Finance looked very favourably at the industries that did not go on the financial market at that time, and that the pulp and paper industry was using its so-called huge profits for financing its own further development. This went over in great style. . . .

"But that was that, and there was a great silence, and the silence continued. . . . Then, suddenly, there was to be a meeting of the Assistant Secretary of the Privy Council and the representative of the Treasury Board, Prebble, and myself, to discuss what was to be done about setting up this Act. I was pretty well armed. There were differences of opinion: there were two ideas. One was a radical reorganization, the other was a very simple bringing together and giving people four or five years to work together and then make a radical reorganization. That was the real difference of opinion. Then there was a brief one-hour session, looking over the draft Act that Justice had drawn up over in their offices, making certain suggestions.

"A couple of days later, the Prime Minister introduced the thing in the House, and it went through. You know, it passed the House of Commons without one dissenting vote. One of the rare times they've done such a thing. It was marvelous. Then it had to go to the

Senate and it had to go before the Senate committee. . . . Prebble and I, with some assistants, went before it.

"Then, here we were; there was nobody in charge. There was no Minister; there was no Deputy Minister; there were no instructions. Agriculture was told not to include Forest Biology in its Estimates; Northern Affairs was told not to include Forestry Branch in its Estimates; and that was all.

"The Act was given Royal Assent at the end of August; the Minister was appointed in October, I think, and he had to fight a bye-election, so that in November the orders-in-council were passed, the Department was created and I was appointed Deputy Minister. . . ."

The Department of Forestry Act, passed by the House of Commons on July 11, 1960, was a short act, divided into three equal parts. Part I provided for the establishment of the Department of Forestry and for the appointment of a minister of forestry. The duties, powers, and functions of the minister were described in section 5 as extending to and including "all matters over which the Parliament of Canada has jurisdiction relating to the forest resources of Canada." This sounded far more all-embracing than it actually was, and the following section, although apparently describing further functions of the minister in detail, clarified that his authority was considerably restricted. Section 6 included a significant part of the Canada Forestry Act: the minister, with the approval of the governor-in-council, has the authority to enter into agreements with any province or individual for forest protection, management, or utilization and related research, or for publicity or education. Subsections d and e limited the powers of the minister, stating that subject to section 5, the minister:

> "(d) may provide for the making of forestry surveys and provide advice relating to the protection and management of forests on lands administered by any department or agency of the Government of Canada or belonging to Her Majesty in right of Canada; and (e) at the request of any department or agency of the Government of Canada, may assume responsibility for the protection and management . . . of any forests on lands administered by such department or agency."

Clearly, therefore, there would be federal forests where the protection and management would be carried out by federal departments and agencies other than the Department of Forestry. In other words, most of the forest lands under federal control would be outside the Department of Forestry, since its jurisdiction specifically excluded the administration of the forests in the Yukon and the Northwest Territories, the national parks, military areas, and Indian reserves. This crucial omission would dictate the subsequent fortunes of the fledgling department.

Part II of the act dealt with forest experimental areas. Section 7 gives the governor-in-council authority to establish forest experimental areas and to change their boundaries. The bill then gave the minister powers regarding the details of the administration and protection of these areas. The governor-in-council was authorized to make regulations on such matters as the cutting of timber, the granting of leases, the protection of these areas, and the control of traffic and trespassers. There was no mention of wildlife management.

Part III, dealing with "general" subjects, repealed the Canada Forestry Act and provided for various technical details involving the creation of the new department, such as an amendment to the Financial Administration Act to make reference to the Department of Forestry.

The expenditures of the new department during the fiscal year 1960–61 were to be met by money appropriated to the Department of Northern Affairs and the Department of Agriculture. The governor-in-council would decide which appropriation should apply to what classification of the Public Service with the Department of Forestry.

The establishment of a federal Department of Forestry revived the question of whether the federal government was justified in playing any but a minor role in Canadian forestry. Was it necessary to establish a separate Department of Forestry, or could the Forestry Branch have performed the necessary functions just as well or even better than the new department? Had the federal government entered a field of activity that the British North America Act reserved for the provinces, since almost all of Canada's forests were under provincial administration? The federal government had authority over only a small portion of forest land. How, then, could the federal government be active in forestry without interfering with provincial rights?

L. Sayn-Wittgenstein noted that the federal government should confine its activities to fields that were either not considered in the B.N.A. Act or that involved no violation of provincial rights. In the first instance, because forest research per se did not exist in 1867, no part of the act forbade the federal government to enter that field. Thus, the department's research did not violate the B.N.A. Act. The only activity of the federal Department of Forestry, he held, that could conceivably interfere with provincial rights was its part in federal–provincial agreements. Because these agreements were voluntary, the provinces were not forced to enter them, and the federal government was careful not to interfere in the administration of the operations carried out under these agreements. The federal government confined its activity to inspections to ensure that the terms of the agreements were followed. If asked by the provinces involved, it would also offer its advice and opinions.

Both the federal government and the provinces were free under the B.N.A. Act to carry out forest research. There was no legal argument why the federal government should assume a leading role in forest research, but there was a strong argument based on efficiency. Alvin Hamilton had pointed out during the debate on the Department of Forestry Act that the federal government was the only agency that had a research organization capable of rapid expansion.

Sayn-Wittgenstein noted:

> "During the entire debate on the Department of Forestry Act no one opposed the Act in Parliament and there was disagreement on only minor matters. This lack of criticism did not require the government to explain why the National Parks Branch and the Wildlife Service of the Department of Northern Affairs and National Resources were not included in the Department of Forestry."

He then noted:

> "The exclusion of these two organizations, a weakness of the new Department, will probably be detrimental to federal forestry. To separate forestry and wildlife management is bad, for the two are so closely tied together that decisions in one field are bound to have

their effect in the other and problems in the two fields are closely connected. By leaving control over the national parks outside the Department of Forestry, the Department has lost an opportunity for practicing and advertising forestry. If the national parks were subjected to proper forest management, this would not, as is often suspected, mean the destruction of their natural beauty. Without the opportunity to manage these lands, the Department of Forestry and particularly the Research Branch may also be in the danger of getting out of touch with practical forestry problems."

Why were the national parks and the wildlife service left outside the Department of Forestry? R.G. Robertson, deputy minister of the Department of Northern Affairs and National Resources, was deeply involved in the negotiations that preceded the formation of the Department of Forestry. He observed in 1974 that there never was any question of adding parks or wildlife to forestry, because in 1960 forestry was chiefly concerned with utilization and effective cropping. Parks, in contrast, was concerned with leaving the forests as much as possible in their natural state; wildlife was associated with parks and the northern territories and it would not have made sense to move it without also moving them. Considering today's concern for ecology, such a transfer makes more sense than it did in 1959. The real issue at that time was whether forestry should become a branch of agriculture or whether forest biology should leave agriculture to join forestry in the new department. Strong views were held on both sides, but the final decision favored the Department of Forestry.

# 29. The Department of Forestry, 1960–66

The Department of Forestry existed as an entity from 1960 to 1966. During that time it was headed by three ministers: Hugh John Flemming for the first 2 years, John R. Nicholson in the 3rd year, and Maurice Sauvé for the remaining period until his defeat in the 1968 election, by which time the department had reverted to a branch. The deputy minister for the first 2 years was Harrison. On his retirement, he was succeeded by L.Z. Rousseau. The capacities, wisdom, and foresight of these five men would determine the fate of the new department.

The first minister in many years to display a serious concern with forestry was Alvin Hamilton. In 1962 Hugh John Flemming was transferred to another ministry and for 1 month the Department of Forestry was headed by Martial Asselin. Before he could make any impact, an election took place and the Liberals were returned to power. John Robert Nicholson became minister of forestry. Nicholson, like Alvin Hamilton, felt that forestry had an important federal role to play. Having previously been connected with the British Columbia Council of Forest Industries, he had more than the average politician's appreciation of the importance of forestry to the national economy. Maurice Sauvé, too, would take his ministry seriously.

Harrison's first annual report, addressed to Hugh John Flemming, stated the objectives of the department. The department would promote improved management and protection of the forest resources, more effective utilization of wood coupled with a reduction in waste, and improvement of the competitive position of the forest industries. It would undertake comprehensive programs of research relating to forestry and the utilization of forest products, and promote and recommend measures for the encouragement of public cooperation in the protection and wise use of forest resources. Harrison reminded the minister that the latter might, with the approval of the governor-in-council, enter into agreements with any provincial government or with any person for forest protection and management, or for forest utilization.

The first organizational structure of the Department of Forestry was simple. It consisted of four branches and an Economics Division. The four branches were administration, forest research, forest entomology and pathology, and forest products research. The Administration Branch, headed by H.W. Beall, embraced general departmental administration, provision of forest surveys and technical advice for other federal agencies, and the administration of federal–provincial agreements. Forest research, with D.R. Redmond as director, A. Bickerstaff as associate director of forest management research, and J.C. Macleod as associate director of forest fire research, was responsible for conducting investigations in the fields of silviculture, ecology, physiology, forest mensuration, tree breeding, forest fire protection, and forest survey methods. Forest entomology and pathology, with M.L. Prebble as director, B.M. McGugan as associate director (entomology), and V.J. Nordin as associate director (pathology), was concerned with research relating to forest insect and disease problems. Forest products research, with J.H. Jenkins as director, embraced research on the mechanical, physical, and chemical properties of Canadian woods, on the development of new and better uses for wood products, and on improved manufacturing techniques to obtain maximum utilization of the wood available from Canada's forests. The Economics Division was headed by A.L. Best and charged with evaluating the economic implications of present and proposed policies, maintaining a

**FIGURE 42. Pulp mill at Campbell River, Vancouver Island, British Columbia. (Photo by John Vallentgoed, Forestry Canada)**

review of the economic position of Canada's forest industries, and conducting economic studies of production in Canada.

A significant appointment took place in March 1962: Dr. L.Z. Rousseau was named first assistant deputy minister. The annual report for that year stated that Dr. Rousseau joined the department following a distinguished career in business, public service, and education. Before his appointment, he held the post of dean of the Faculty of Forestry at Laval University. Rousseau's appointment was puzzling. Made on the eve of Harrison's retirement, it was obviously intended to provide Harrison's successor. A distinguished scholar with some business background, Rousseau seemed hardly an apt choice to succeed the adroit and resourceful Harrison in the delicate work of building up the new department. Harrison had thwarted two formidable opponents, Dr. E.W.R. Steacie of the National Research Council and Ken Neatby of the Department of Agriculture, over the issue of whether the Forestry Branch would be divided between the Department of Agriculture and the National Research Council or whether the Science Service would lose Forest Biology to the disputed Department of Forestry. Rousseau's appointment was probably intended to provide a "neutral" head to smooth over the fusion of the two previously rival research elements making up the department.

The internal jockeying for position between the former Forestry Branch and Forest Biology elements would result in the latter establishing a stronger position. Forest Biology was an organization devoted primarily to research and had no fewer than 16 Ph.D.'s in its leadership. The Forestry Branch counted exactly five Ph.D.'s among its leaders; one of these, Redmond, was a former forest pathologist and two of the others were in forest products research. Prebble may have lost the battle in 1959, but he would win the war.

After Harrison's retirement, Rousseau became the deputy minister. He understood the need for scientists to tell their story to the public, and he took every opportunity to communicate the results and benefits of forest research to the Canadian people. He has expressed his views vigorously on the subject:

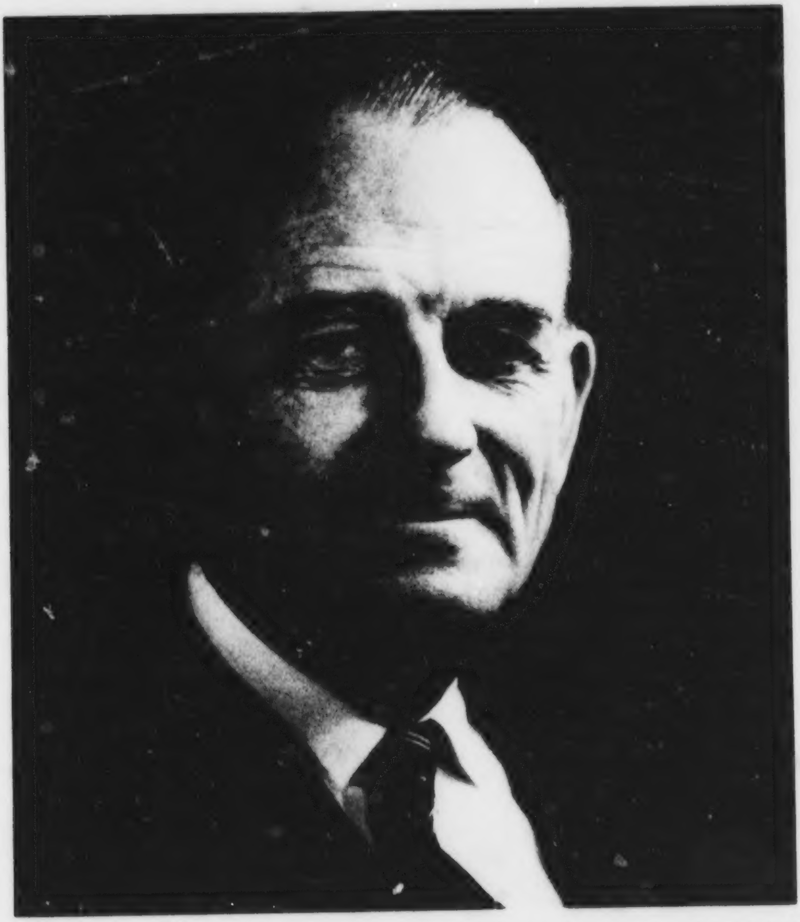


FIGURE 43. Dr. L.Z. Rousseau, deputy minister of the Department of Forestry 1962–66 and the Department of Forestry and Rural Development 1966–67. (National Film Board)

> "Let me state first that my feeling is that government services, their heads, their personnel, should be hell-bent on doing a selling job, for the very simple reason that budgetary appropriations are decided on the basis of information. The run-of-the-mill Member of Parliament does not know much about forestry in his own constituency, and members from urban communities know even less, if anything at all, on the subject. It is up to the qualified personnel of the Dominion Forest Service to communicate if he is to keep his job, do it well, and be proud of it.
>
> "This is particularly true when the department is a research outfit. If the public is not made aware of the type of work conducted, and its impact on business, on industry, and on the general welfare of the country, . . . then we can't expect to elicit any sympathy from the general public and its representatives in the House of Commons.
>
> ". . . I hope communication was improved during my stay with the federal [forestry service], and I am pretty sure it was. The public image of the Forest Service is largely obtained through our publications. These publications should not only . . . be of a strictly technical or scientific nature; they should also be translated in terms which the layman can understand. In this sense I think that, during my stay with the Forest Service at Ottawa, progress was made, and this progress has continued. . . . I have personally contacted some scientists and found them pretty reluctant to 'degrade' themselves by communicating with the public in simple terms. They are afraid of misinterpretation by simplifying the exposition of thier projects. If the scientist has a full grasp . . . of his subject, I don't see why he cannot translate it into simple terms. And unless he does that, and does it himself, moreover, he won't get anywhere. At least his job will always be difficult. He should, I think, make himself known in his particular local environment. I don't see why he should not address the Chamber of Commerce, social clubs and so forth, and tell them what he is doing. That is important."

Nicholson was the new minister in 1963, but Rousseau signed the 1962 annual report. A general austerity program was implemented in 1962, before the department had been properly launched. Difficulties were experienced throughout the fiscal year in continuing the vital organizational developments of this newest government department and in maintaining existing research programs. Internally, the staff-recruiting restrictions were most damaging in their effect on the proper development of new programs of economic studies, public information and technical services, and on the establishment of a statistical analysis unit.

Nicholson had arrived at the Department of Forestry to find a state of demoralization resulting from the austerity wave that struck the department so soon after its birth. D.R. Redmond recalled that Nicholson assembled everyone in a board room in the Confederation Building and encouraged each one to speak up about his programs and the effect of the austerity wave. Then he went to work, obtaining positions and funds. Morale was boosted and the losses were soon regained. "He was a great front man," said Redmond. "Industry started to come back. He beat the drum both in Canada and in the United States for Canadian forestry, and was on the verge of enticing the Agricultural Rehabilitation and Development Act (ARDA) into the Department when he was shifted into another ministry." There was widespread regret in the department when Nicholson left, for he was popular with everyone.

Maurice Sauvé was also a driving, young minister, but as one of the "new" Quebec

Liberals, he lacked the support of the politicians who ran the Quebec wing of the Liberal party. However, he had Pearson's confidence, and he promptly added to the department's budgetary muscle by securing the administration of ARDA, the Maritime Marshland Rehabilitation Act (MMRA), and the Western Feed Grains Freight and Storage Assistance Program. He also persuaded Pearson to transfer national parks from northern affairs, for he realized that forestry desperately needed an operational role to make its research more meaningful and to give it some political clout. However, Arthur Laing, then minister of northern affairs, protested loudly, and the order-in-council was reversed the next day. "Pearson never believed that the Department of Forestry, as it then existed, was viable," Sauvé later said, "and I felt the original Department was unreal: it had no weight, no serious budget."

Yet the department grew at a healthy rate under Sauvé. Rousseau's summary of activities grew longer each year. One of the highlights of 1963 was the convening of the first Federal–Provincial Forest Ministers' Conference in Ottawa on October 21 and 22, chaired by Nicholson. All the provincial forest ministers attended, as well as senior observers from interested federal departments. The new forest research laboratory was under construction in Victoria and preparations were under way for another at Edmonton.

The first step towards the disputed departmental reorganization that would be "appropriately oriented towards our functional responsibilities to the Canadian forest community" was initiated with the appointment of a three-man reorganization survey team, consisting of B.M. McGugan and Cecil Tuck of the department, and one official from the Organization Division of the Civil Service Commission. They were promptly named the "Three Wise Men," a derisive sobriquet based on the fact that McGugan (a biologist), Tuck (a departmental personnel man), and the organization man from the civil service commission knew virtually nothing about forestry, and none had experience in running a large organization. However, by the end of 1963 their draft report was near completion, and the big news was the proposed reorganization, scheduled to take effect on April 1, 1965.

A preliminary step, which went into effect in February 1965, effectively established the strength of the Forest Biology group within the department. This was the establishment of a group of special advisers to the deputy minister. In one neat stroke H.W. Beall, former director of the Administrative Branch, became special adviser; Dr. D.R. Redmond, former director of the Forest Research Branch, became scientific adviser; Dr. J.H. Jenkins, former director of the Forest Products Research Branch, became forest products adviser; Dr. D.A. Wilson, former director of the Economics Division, became economics adviser. Dr. M.L. Prebble was promoted from director, Forest Entomology and Pathology Branch, to the key post of assistant deputy minister (forestry), and his former associate director and coauthor of the reorganization plan, Dr. B.M. McGugan, obtained another key post, director of program coordination. These special advisers reported directly to the deputy minister, along with the heads of administration, information and technical services, and personnel. The feed grain administration also reported directly to the deputy minister, and forestry and rural development were each headed by an assistant deputy minister. Under Prebble, of course, came program coordination, the regional establishments, and the institutes. The regional establishments included Newfoundland (St. John's), the Maritimes (Fredericton), Quebec (Sainte-Foy), Ontario (Sault Ste. Marie), Manitoba–Saskatchewan (Winnipeg), Alberta–Northwest Territories–Yukon (Calgary), and British Columbia (Victoria). The institutes, grouped on the reorganization chart with the forest products laboratories at Vancouver and Ottawa and the Forest Experiment Station at Petawawa, comprised the Insect

FIGURE 44. Building 303, one of two buildings of the Newfoundland Forestry Centre, Pleasantville, St. John's, Newfoundland. (Photo by D.R. Rex)

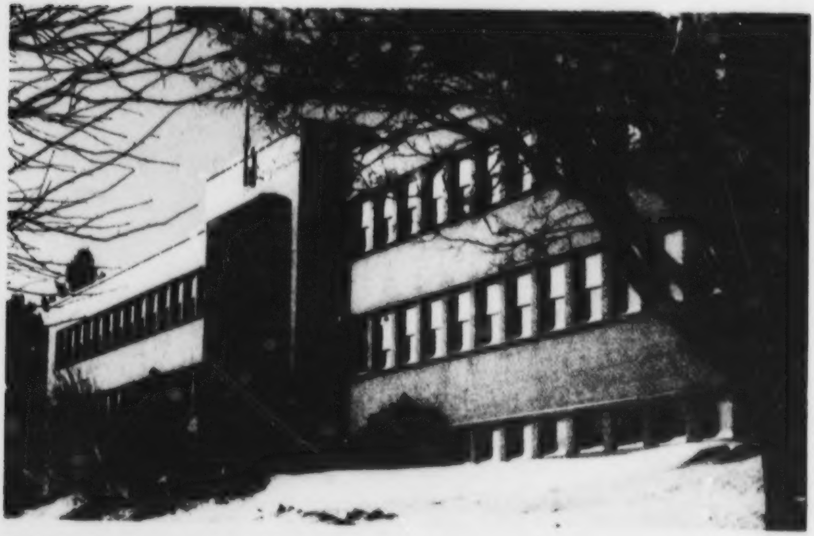


FIGURE 45. Forestry Canada — Maritimes Centre, Fredericton, New Brunswick, in February 1986. (Forestry Canada — Maritimes)

FIGURE 46. Laurentian Forestry Centre, Sainte-Foy, Quebec, in 1984. (Photo by Claude Moffet, Forestry Canada)

Pathology Research Institute at Sault Ste. Marie and four other institutes, all located at Ottawa: Forest Management Research and Services, Forest Economics, Forest Fire Research, and Chemical Control.

Although the appointment of the special advisers effectively removed the leaders of the forestry element in the department from "line" responsibility, as senior advisers to the deputy minister, their input into forestry policy would have been increased. Indeed, this would have been so if the position of senior adviser had been intended for this purpose, or if the deputy minister had wished it to be so. However, this was not the case. When Jenkins retired almost immediately after his appointment, his position as forest products adviser was not refilled and the same fate befell both Beall's and Wilson's positions when they later retired.

The purpose of the reorganization was to "fully integrate all research services, . . . allow free lateral communication between research and nonresearch activities at all levels." Henceforth there were to be three major forestry elements within the department: the senior advisers, a single comprehensive organization that came under Prebble, and a program coordination group that would "provide guidance in the Department's research program and . . . coordinate research projects on a problem basis."

Arthur Bickerstaff recalled the reorganization period:

"There was a period of rather chaotic organization for a year or two, which was finally resolved in 1965 when a definitive organizational plan came into being. One of the problems that resulted in the chaos was that before people were appointed to various positions in the new organization, the old organization was supposed to develop programs for various regions, institutes and so forth, without anyone having any responsibility for it. There were great meetings taking place regarding programs. Often there were quite strong differences of opinion, which were eventually resolved. If they weren't resolved, it was agreed that a certain course of action would be taken, and we'd get on with the next business. When the new appointments were made to implement the plan in 1965, the problem was that those appointed to direct various program segments were stuck with a lot of rather academic proposals that had been made by earlier committees. So the exercise had to start all over again, with each Director formulating his own program and trying to get it approved, and also battling for staff."

Prebble's approach to administration and organization, as expressed in November 1972 when he was still assistant deputy minister, is revealing considering developments after the reorganization:

"I think probably it would be true to say that I have not been very much interested in administration, except as a means to get the work done. . . . I have never made a fetish of administration and . . . I would not want to. As a matter of fact, I was in charge of the forest insect laboratory for quite a number of years and was visited one time by two gentlemen

FIGURE 47. Great Lakes Forestry Centre, Sault Ste. Marie, Ontario.

from the Public Service Commission who were quite interested in finding out what made this organization tick, because we did have a pretty good reputation for getting good work done. And they asked to see my organizational chart and I didn't even have an organizational chart and I never use an organization chart. . . . They came to me with a full chart in rectangular form. I said that . . . if they wanted to draw an organizational chart that represented what really was going on, they would have to use a wheel with myself and my immediate associates at the hub and all the research staff out at the spokes. . . ."

W.A. (Ed) Reeks, an admirer of Prebble, said of him at this period:

"If I could speak in any critical vein of M.L. Prebble, it would simply be one with reference to his unwillingness to drop responsibilities. . . . Men of lesser strength would have wilted under the pressure of work. . . . His capacity for work, his insistance on accuracy and his ability to see a weak link in a research program is just beyond description."

On February 15, 1965, the new Forest Research Laboratory at Victoria was opened by Major General the Hon. George R. Pearkes, lieutenant governor of British Columbia. The new installation brought together in one facility all the department's research activities for forest products research.

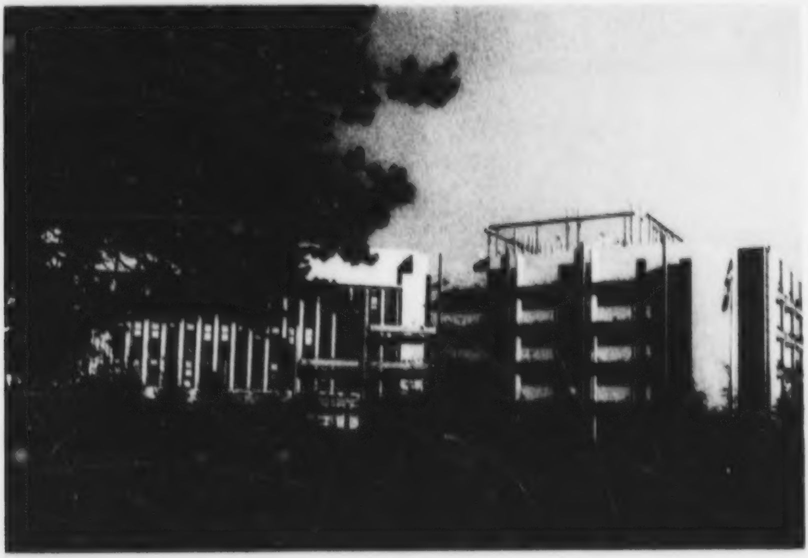


FIGURE 48. Pacific Forestry Centre, Victoria, British Columbia. (Photo by Ed Chatelle, Forestry Canada)

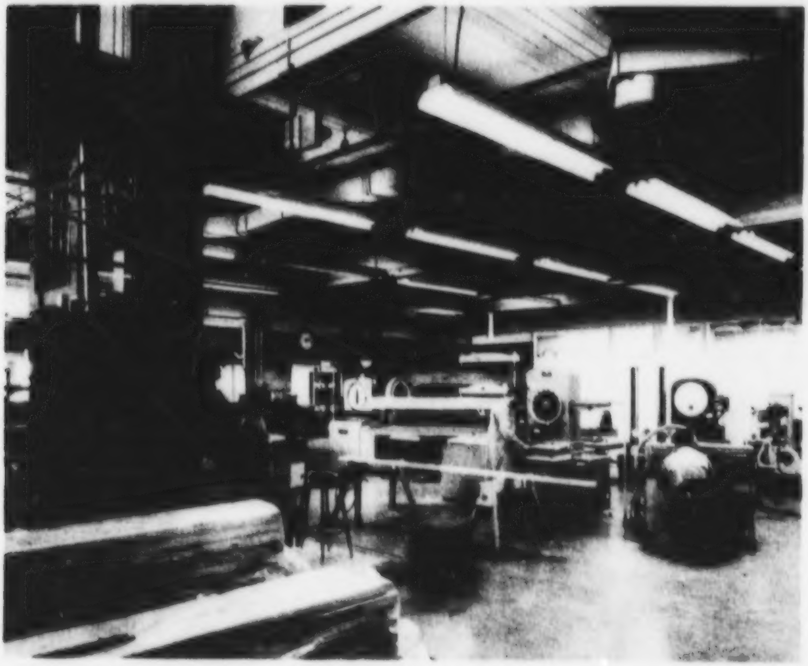


FIGURE 49. Timber engineering ca. 1967 — part of testing equipment in engineering section of the laboratory.

Federal contributions under shared-cost forestry agreements had now reached $54 million since 1951–52. A new composite agreement for the period from April 1, 1965 to March 31, 1967 was offered to all the provinces.

The final year of forestry's brief life span as a department was the fiscal year ending March 31, 1966. Forestry had grown rapidly in 6 years. Progress would not be so easily achieved thereafter, but in 1966 the future looked rosy. Rousseau's preamble to the annual report was brief, and its chief reference was to the National Forestry Conference:

"Standing on its own as an event of major significance during the year was the National Forestry Conference held at Montebello, Quebec, February 21–24, 1966. The third forestry assembly of a national character sponsored by the Government of Canada over the past 60 years, the conference brought together 165 representatives from forest industries and their associations, universities, provincial and federal government departments, to study in depth a wide range of subjects bearing directly and indirectly on the welfare of Canadian forestry. The essential nature of these subjects is reflected in the main question-division of the Agenda: (1) What is the present demand for Canada's forest resources? What will it be in 1975? In 2000? (2) What is the present state of Canada's forest resources? (3) What must be done to ensure that these resources meet 1975 and 2000 demands effectively?"

The National Forestry Conference strongly supported the reorganized department, and hopes were high that Canadian forestry would move ahead rapidly in future years.

The final annual report of the Department of Forestry reflected the activities of a bustling and growing department, deeply involved in the activities and programs of about 26 various international organizations. Internally, the report covered federal–provincial agreements, land inventory and soils research, regeneration studies, forest measurement and surveys, and forest fire control. Major insect and disease problems, insect control and decay research, were reported on native organisms and introduced organisms; forest products research covered nondestructive testing of wood, timber engineering, veneer and plywood, fire research, wood seasoning, logging, and sawmilling. The Department of Forestry had seemingly limitless possibilities ahead of it, requiring only decisive leadership to realize those possibilities.

# 30. The Forestry Branch in the Department of Forestry and Rural Development, 1966–68

On June 16, 1966, under the terms of the Government Organization Act, the Department of Forestry became the Department of Forestry and Rural Development. A Forestry Branch and a Rural Development Branch were designated and there was no structural reorganization of the department required in conjunction with these name changes.

Thus was the new structure explained in the introduction to the 1966–67 annual report of the Department of Forestry and Rural Development. This explanation barely covered the brutal facts of political reality. As Maurice Sauvé would explain 8 years later: "ARDA and Feed Grains was where the action was. I became deeply involved in economic development and ARDA. There never was any big challenge with Forestry; never any problems." Here, surely, was one of the crucial turning points in the history of federal forestry. Why was Sauvé not advised of any challenges or problems in forestry, even after the National Forestry Conference had so recently posed them? Arthur Bickerstaff commented:

> "In 1960, when the new Department of Forestry was formed, it had industry and provincial support. To a degree, it still had it at Montebello. However, after that, it really fumbled the ball from lack of follow-up after Montebello, by lack of focus and clear direction in its program. As a result, provincial and industry support started to drop. Quite a few people were aware of what was happening, but there was no way of getting Rousseau or Prebble to do anything about it."

Yet, Sauvé, like his predecessor, worked hard for his department, and forestry federal–provincial relations during his regime were possibly better than at any other time. Sauvé visited each provincial premier, minister of agriculture, and minister of lands and forests across Canada at least once a year, and on different visits, so that each individual would recognize that the trip was being make specifically to see him rather than as part of a general visit.

Furthermore, Sauvé had secured Treasury Board approval, in July 1966, for an ambitious expansion program that would provide the Forestry Branch with the apparatus and the manpower to exercise a role in federal forestry in keeping with the challenge posed by the Montebello conference. It was a 6-year program. When his advisers suggested a 10-year plan, Sauvé, ever a political realist, replied: "Make it six years. No cabinet ever thinks ahead more than that."

Thus, in its 1st year of reduced status, the Forestry Branch continued to make important gains. One of the major developments was the establishment of advisory committees in five of the regions. These committees consisted of representatives from provincial forest services, forest industry associations, universities, and other agencies concerned with forest conservation, together with the Forestry Branch regional director. The committees defined and evaluated regional forestry problems, outlining priorities in research need and promoting coordination between the research of the Forestry Branch and that of other agencies within the region.

In forest products research the branch adopted a similar committee approach to ensure that the wood-using industries were consulted when problems requiring research were defined and when research priorities were assigned.

In conjunction with the 6-year Forestry Branch expansion program, more than 100 research officers were appointed during the fiscal year. These enlistments were intended to strengthen work in such fields as land classification, soils research, silviculture, mensuration, fire research, pest control, and forest products research. A start was also made on building up essential research facilities at several regional establishments and research institutes.

Unfortunately, this increase in staff occurred at the same time as a major reduction in activity for the Forestry Branch, as the federal–provincial forestry agreements ended on March 31, 1967. Since their inception in 1951–52, almost $64 million in federal funds had been spent in support of forest inventories, reforestation, fire protection, access roads, and stand improvements, all carried out by provincial forestry departments. Their termination had been part of a Cabinet decision in which several federal–provincial shared-cost agreements in various departments had been terminated. At a meeting with the minister and senior department officers, H.W. Beall had fought tenaciously to maintain the forestry agreements, which stipulated that the provinces meet or increase the federal funds they received. In fact the agreements constituted the tangible expression of a national forestry policy. Beall did not remember receiving strong support from his colleagues for the program, but Sauvé listened politely to his reasoned arguments. However, the Cabinet decided to maintain and increase ARDA funds and to terminate the forestry shared-cost agreements. Henceforth, federal funds would be allotted to the provinces unconditionally, thereby eliminating means of obtaining any leverage to establish national standards of forestry practice.

Two days after the decision was announced, Beall attended the 1967 annual meeting of provincial forestry deputy ministers and chief foresters in Victoria, B.C. There he found himself the scapegoat for the decision and received a certain amount of verbal abuse. He said later:

> "Most of the provincial forest services were sorry to see the Agreements end. They now had to fight for funds from the provincial treasury in competition with other departments of their own governments, whereas before, they could count on a certain amount of money being almost automatically provided. . . ."

Politically, the Forestry Branch found itself vulnerable: just as it was hiring over 100 scientists, it lost a major program and, at the same time, strong provincial support. The branch leadership consisted exclusively of research scientists, outstanding scientists; there wasn't a political animal among them and that lack would cost them dearly.

Rousseau retired as deputy minister in 1967 and was replaced by L.E. Couillard, formerly vice-chairman of the Economic Council of Canada. Despite the fact that he had no previous background in forestry, Couillard was effective for the brief time that he served. At the Fourth Session of the North American Forestry Commission, held in Mexico City in October 1967, the Canadian delegation was headed by Couillard, who made a major impact, according to Bickerstaff, "both by his recommendations and by the fact that he spoke fluent Spanish."

Within the Forestry Branch substantial progress was made in the expansion program. In addition to staff increases, an active building program was pursued. Despite the termination of the federal–provincial forestry agreements, special agreements were in effect with four of the provinces during the year. These covered spruce budworm spraying in New Brunswick, balsam woolly aphid surveys in British Columbia, Swaine jack pine sawfly spraying in Quebec, and a forest inventory and land capability survey in Newfoundland. The branch programs appeared to reflect healthy internal growth. The level of activity in the forest products area indicated the vigor with which the branch tackled its research responsibility. The staff of the Eastern Forest Products Laboratory was increased from 147 to 171, while that of the Western Forest Products Laboratory rose from 106 to 136. Research covered 14 main areas of activity.

In wood anatomy, a cooperative project was undertaken with the British Columbia Regional Laboratory and the Pacific Logging Company, involving the measurement of changes in volume growth and specific gravity in Douglas-fir after the application of fertilizer.

The structure and properties of the extractives of western red cedar were the subject of further research. Studies of the extractives of eastern Canadian hardwoods, particularly

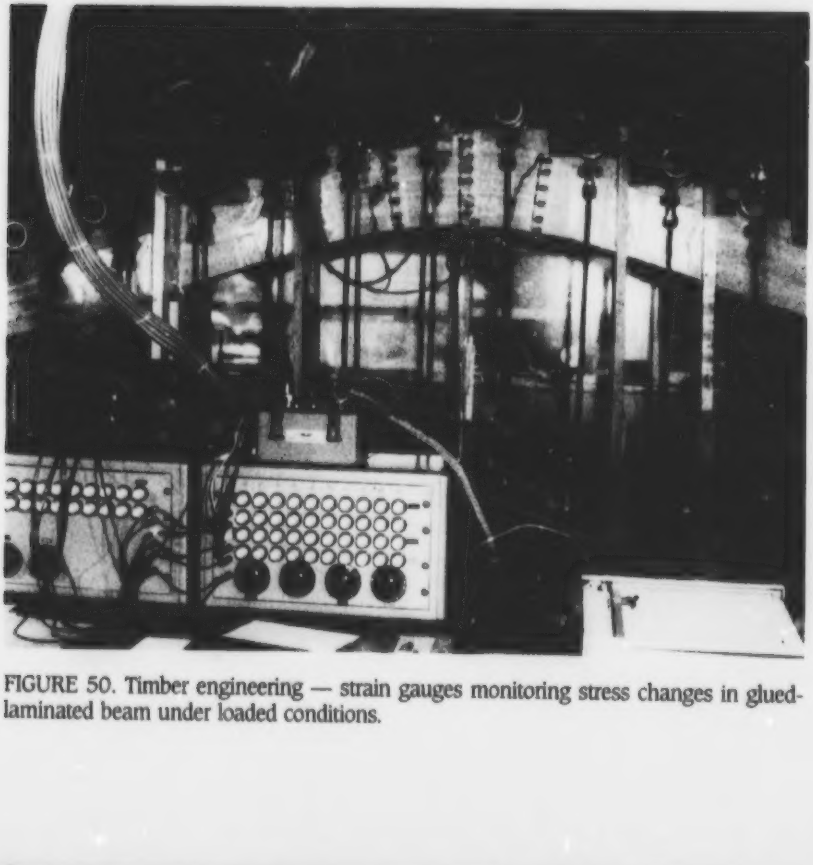


FIGURE 50. Timber engineering — strain gauges monitoring stress changes in glued-laminated beam under loaded conditions.

birch, maple, and elm, were also made. Further research in wood chemistry, including observations on the photochemical degradation of wood, was designed to provide information to obtain more durable coatings.

In structural design research, theoretical studies of stresses in pitched, tapered, laminated beams were supplemented by actual measurements. A specially fabricated beam was loaded and the results were measured by photostrain and electrical-resistance-strain gauge techniques. The buckling of the compressive face of stressed-skin panels was also examined to develop more efficient reinforcing designs. The search for improved working stresses for use in engineering design in wood was continued emphasizing strength data derived from full-sized timbers.

In sawmilling, research was done on the cutting tool of a simulated ring-type debarking machine to improve efficiency in debarking frozen (–34°C or –30°F) white spruce logs. In the conversion of high-quality, hard maple logs to furniture components, preliminary data showed that live sawing followed by grade rippling produced 20% more lumber value than did the taper sawing of logs on four faces. Production characteristics of headrigs designed for sawing small logs into lumber and simultaneously producing chips from the

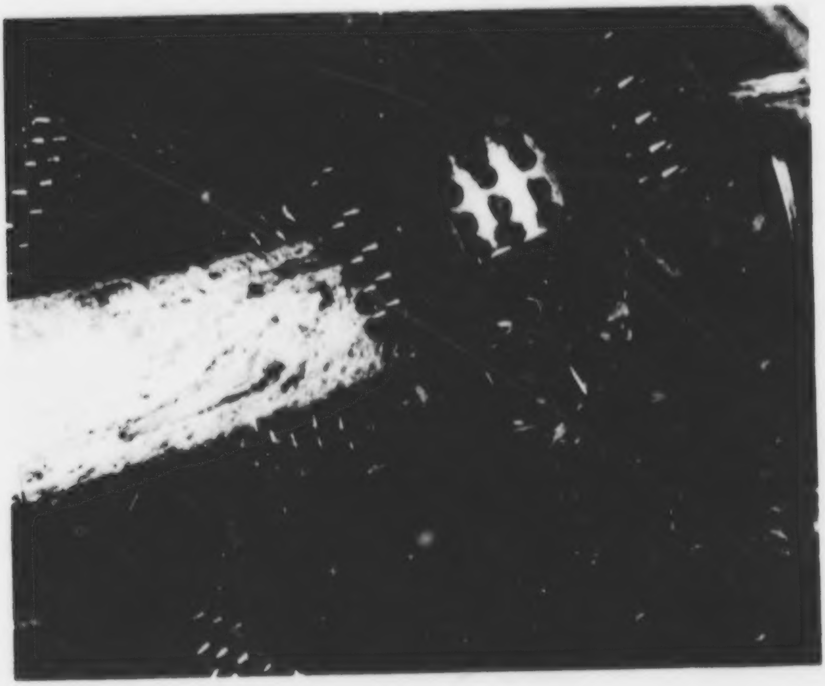


FIGURE 51. Logs are often debarked with a ring debarker.

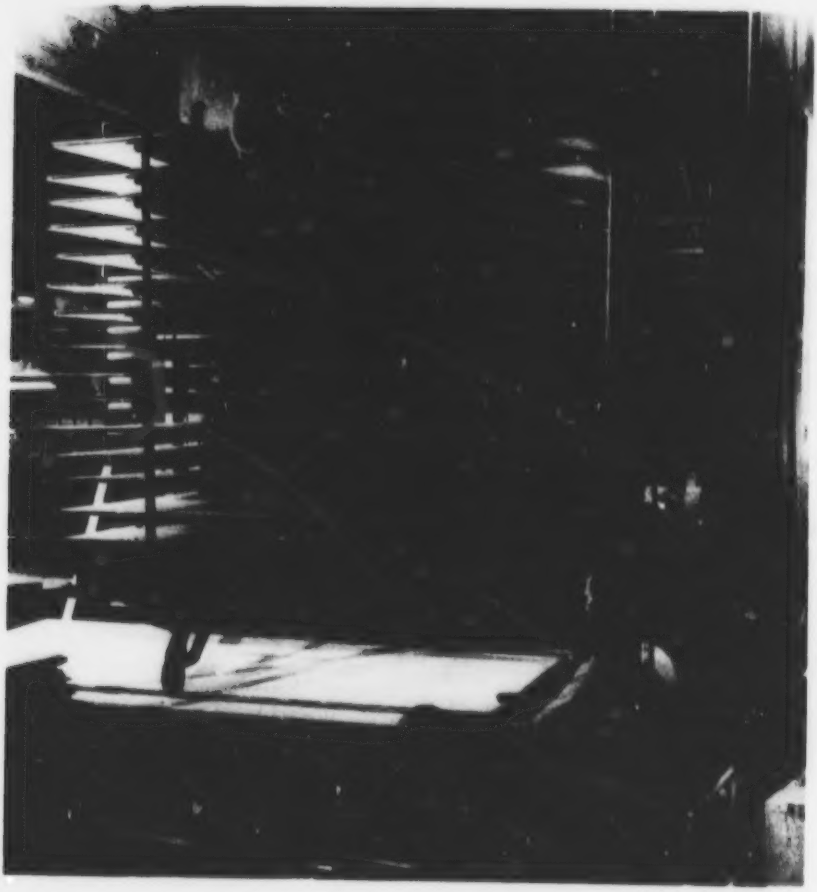


FIGURE 52. Feeding plywood panels into a hydraulic press where heat and pressure are applied to cure the plywood.

residue were measured and compared with those of conventional machinery. The new equipment was found to reduce processing costs by about 50% and to decrease sawdust production approximately from 20 to 5%.

A new method for reducing both the seasoning degrade and drying time of lumber was explored. The treatment consisted in "prestressing" boards by passing them through a pair of pinch rolls, the pressure on the green boards being sufficient to cause a momentary thickness reduction of 5–15%. Initial trials were promising and further work was in progress to determine both the optimum treatment and the underlying anatomical and mechanical factors involved.

Thus, optimistically involved in an internal expansion program just when its national role had been sharply curtailed and when fresh initiatives in terms of national programs justifying expansion in political terms were lacking, the Forestry Branch moved into the next phase of its development.

# 31. The Department of Fisheries and Forestry: From Branch to Service, 1968–71

The year 1968 had begun so auspiciously. While still in the Department of Forestry and Rural Development, senior officers of the Forestry Branch had, early that year, drawn up a substantial growth program. Encouraged by Sauvé and approved by both Prebble and Couillard, the program would have continued the expansion of the branch, but by the time it was submitted to Sauvé for his signature, to go before Cabinet, the political climate had changed. The effect of the 1968 post-Expo recession was being felt and, even more significantly, there was no evidence of supporting pressure from either industry or the provinces for such expansion. Sauvé announced regretfully that he was unable to sign the document.

The next disaster that struck the branch resulted from the 1968 election. Pearson had stepped down as Liberal leader and had been succeeded by Trudeau. Trudeaumania swept the country and the Liberals were returned in a landslide victory. But there was one notable casualty: Sauvé's Magdalen Islands seat had been lost through redistribution and the failed to carry a mainland riding. He went to private industry, Consolidated Bathurst Pulp and Paper, and federal forestry lost an eloquent spokesman. Equally disastrous was the departure of Couillard to immigration as deputy minister: he had been far more effective than his predecessor in forestry.

In the new Trudeau government, forestry was consolidated with fisheries into the Department of Fisheries and Forestry and headed by energetic, outspoken Jack Davis. Coming from British Columbia, where both fisheries and forestry bulk large in the economy, Davis seemed a logical choice as minister, but he soon made it clear that fisheries was his chief concern. His deputy minister was A.W.N. Needler, an outstanding fisheries authority and a skilled negotiator in the international fisheries field. Fisheries preceded forestry in the new department's name.

Meanwhile, the original 6-year expansion program of the Forestry Branch continued, the planning of new research facilities being highlighted by the awarding of a contract totalling $4 539 808 for the construction of the new regional laboratory at Edmonton. Seventy-four positions in the scientific and professional category were filled. Still, no bold new national programs were announced to justify the expansion. Instead, the branch pressed forward on the international front, making up there for its lack of initiative at home. Its head was laid trustingly on the block when, in the fiscal year 1969–70, the axe came down.

The blow was preceded by a simple name change, and some head office developments. The name "Canadian Forestry Service" was adopted in 1969 as the official title of the forestry component of the Department of Fisheries and Forestry, replacing the previously used name "Forestry Branch."

Concerning the change of names, Bickerstaff has observed:

"I think this is of more importance than is sometimes realized. . . . I don't think it makes the slightest difference to most people in the federal government what department they belong to, because the departments change every year, and there is no such thing at most levels as departmental allegiance or identification. But there is a strong identification at a lower level, possibly two lower levels. One of them is the local or regional individual establishment; people like to feel they belong to it or are part of it. Then there is the identification of a natural organizational grouping, as it were. I think the Canadian Forestry Service is a natural grouping comparable to the Canadian Wildlife Service being a natural grouping or the Geological Survey of Canada being a natural grouping, and it shouldn't really be split. You can put them together in any combination, but they must maintain their individual identities. I think it is of extreme importance that we maintain the identity of a Canadian Forestry Service. . . .

". . . I feel rather strongly about having a Canadian Forestry Service . . . . Some time in the last five years [1968–73] I believe, during one of the reorganizations, I received a copy of a memorandum from headquarters indicating that the name of the forestry element was going to be changed to some horrible thing — I can't quite remember what it was — something like a forestry research group. . . . I forthwith picked up the telephone and phoned every establishment director that I could find, and asked whether they had received this horrible memorandum, and they had. I asked whether they shared my view that this was pretty awful and that they should do something about it. Couldn't we call it something simple and keep the name? And I said, 'The Canadian Forest Service,' and I think there was agreement on this.

"So, after having done that, I telephoned the man from whom I had received the memorandum, told him what I had done, and said, would he please do something about it?. . . . He was able to make it stick, with a minor modification. It turned out 'Forestry Service' instead of 'Forest Service.' "

The 1969 annual report contained far worse news. Departmental expenditures in 1970–71 were to be held at 1969–70 levels despite retroactive salary increases averaging approximately 20% which were negotiated in 1969. This concerned particularly the Canadian Forestry Service because salaries and wages constituted 80% of its operation and maintenance budget. Since it was not possible to effect significant savings by curtailment of other programs (capital construction, grants, and contributions), it was necessary to reduce the forestry program and associated staff to the level that could be financed with funds available in the new fiscal year. Staff reductions through layoff in the closing weeks of 1969–70 amounted to 22 professionals and 77 other full-time employees, or approximately 6% of the full-time staff complement of the Canadian Forestry Service. Essentially, all establishments of the service were affected by these program and staff adjustments, but the most far-reaching change involved the merging of the forest research laboratories at Winnipeg and Calgary, the former serving Manitoba and Saskatchewan, and the latter Alberta and the Territories. The amalgamated establishment to serve the three Prairie provinces and the Territories was to be located at Edmonton, and small liaison units were to be established at Winnipeg and Prince Albert.

Apart from the curtailment of programs, the blow to morale was brutal and long-lasting. The service had been making important strides in almost every branch of research. Its work was respected throughout the world and its advice was sought by international bodies. It was believed widely that the blow could have been softened, for the department itself had a budget sufficient to avoid the cuts, but the decision was made not to transfer those funds. An unfortunate quote was used out of context in the press, to the effect that the minister was "cutting the deadwood out of the Forestry Service." Some of the people who were released were world-famous in their disciplines. One in particular, whom the service

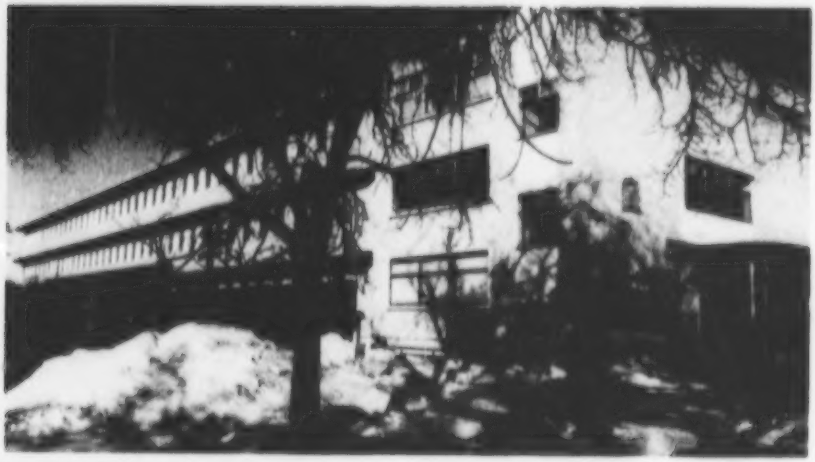


FIGURE 53. Canadian Agriculture Building, University of Manitoba — Canadian Forestry Service Winnipeg laboratory closed in 1969. (Photo by Mike Grandmaison)

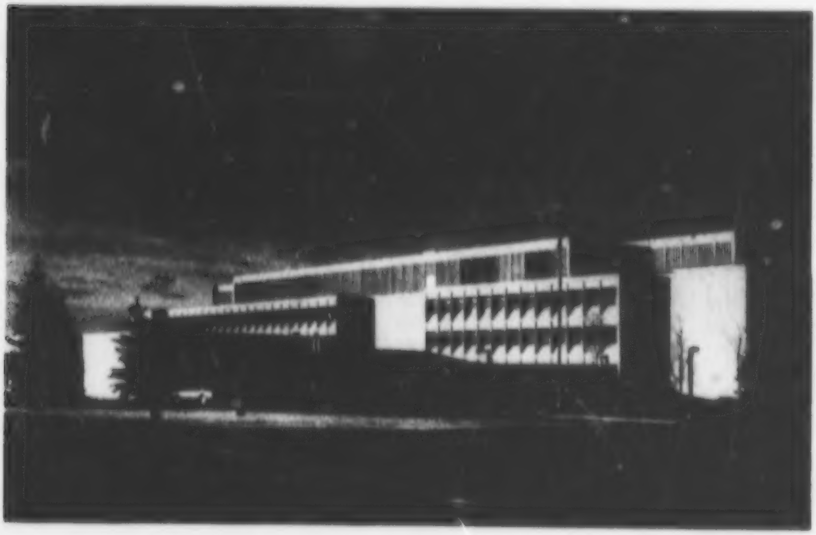


FIGURE 54. Northern Forestry Centre, Edmonton, Alberta, in January 1987. (Photo by Phil S. Debnam)

FIGURE 55. Dr. M.L. Prebble, assistant deputy minister of the Department of Forestry 1965–66, the Department of Forestry and Rural Development 1966–68, and the Department of Fisheries and Forestry 1969–71. (Forestry Canada)

had persuaded to come to Canada to take a post with it, was a world authority on mycology. He went to the United States on his release and became involved in a successful mushroom-raising venture.

Dr. I.C.M. (Cam) Place said:

> ". . . If we were to continue operating, we either had to spend the time . . . doing nothing for the next year or two, or we had to close establishments and discharge staff. This was one of the most unpleasant experiences I have gone through in my service with the Department. . . . I had the unpleasant experience of having to tell some 25 of my staff down in the Maritimes that they were going to be released early in the spring. This news was being broken to them just before Christmas. . . .
>
> " . . . As a result of that austerity move, we had to close our Winnipeg establishment, which we badly need now in 1973. The Northern Forest Research Centre at Edmonton is just trying to cover too large a territory. They have the three Prairie Provinces and they have the Northwest Territories, the whole central portion of Canada, and this is just too big to manage from one establishment. They are in a desperate fix, trying to work with limited resources, enormous travel expenses, and no less than four different governments to satisfy. . . ."

Prebble was both criticized and praised for his role during the bloodletting. On the one hand, his approach to the preparation of annual estimates was more that of a naive scientist than that of a practical leader of a government branch. His strict policy of eliminating every ounce of "fat" from the estimates, of insisting that they meet the exact requirements precisely stipulated, and that Treasury Board deadlines be honored left him with no room to maneuver when he was faced with the necessity of holding the line on the budget; nor was he able to muster any effective support from either industry or the provinces at the time of crisis. The situation is curiously parallel to what occurred in 1930 in the Department of the Interior. At that time forestry was victimized when it voluntarily cut its budget only to experience a further 50% cut when, as later, it had no effective political support to soften the blow.

On the other hand, Prebble accepted the entire responsibility for the difficult decisions that had to be made. He emerged as an inflexible man of unquestioned integrity but with little political acumen. Speculation is inevitable on the manner in which Harrison or Neatby would have faced this crisis. Firstly, neither would have become isolated. Both were too astute politically to let themselves become exposed to such a massacre. Also, either would have better handled Davis, who respected people who talked back to him but had little tolerance for quiet-spoken scientists with no understanding of political realities.

So the service regrouped its shattered and demoralized forces and tried to recover from the trauma. But other and potentially more devastating changes were on the horizon for the hard-pressed organization. These were foreshadowed in the third and last annual report of the Department of Fisheries and Forestry, for 1970–71. The Department of the Environment was in the wings and was about to take the stage.

# 32. Environment Canada: The Canadian Forestry Service, 1971–73

The Department of the Environment, in which the Canadian Forestry Service would find itself in the final 2 years before its 75th birthday, was a unique federal department. It was the first of its kind and was created in response to the need to know whether there would be any environment to support human life by the year 2000.

The speech from the throne on October 8, 1970 discussed eloquently this dominant issue of our time. On the following day, speaking in the House of Commons, Prime Minister Trudeau elaborated:

> "The government will shortly be taking steps towards the establishment of a new department by assigning to the Minister of Fisheries and Forestry (Mr. Davis) the responsibilities and related elements of the public service which would permit him to take a broad ecological perspective in the discharge of his responsibilities, and in particular to take the lead in the enhancement of the quality of our environment.
>
> "A bill relating to the organization of the government will also be introduced shortly, proposing the establishment of a department concerned with renewable resources and environmental affairs which will have as its core the Department of Fisheries and Forestry, whose functions will be expanded to bring under the direction of a single minister the principal governmental activities relating to environmental quality in general and pollution in particular."

The Department of the Environment was established by the Government Reorganization Act, 1970, which received Royal Assent on June 10, 1971. The department, which would also be known as Environment Canada, would have as its primary duty the protection of Canada's air, water, and land resources.

Environment Canada was made up of the former Department of Fisheries and Forestry; the Canadian Meteorological Service, from the Department of Transport; the Air Pollution Control and Public Health Engineering Divisions, from the Department of National Health and Welfare; the Water Branch, from the Department of Energy, Mines and Resources; the Canada Land Inventory, from the Department of Regional Economic Expansion; and the Canadian Wildlife Service, from the Department of Indian and Northern Affairs. National parks, which obviously belonged with wildlife and forestry in this new ecological thrust, was not transferred to Environment Canada.

The department consisted of five resource services, each administered by an assistant deputy minister: the Atmospheric Environment Service; the Environmental Protection Service; the Fisheries Service; the Lands, Forests and Wildlife Service; and the Water Management Service. In addition, the department had a Policy, Planning and Research Service and a Finance and Administration Service. An Environmental Advisory Council was established to advise the minister on the broad problems of environmental management, while a Forestry Advisory Council and a Fisheries Advisory Council dealt with major renewable resources.

The Canadian Forestry Service found itself in one of the five divisions of the Department of the Environment, being somewhat similar in status to what it had been in the Department of Mines and Resources, where it had been one of the four divisions making up the Lands, Parks and Forests Branch. One important difference, however, was that the assistant deputy minister heading the division was forestry's Malcolm Prebble.

At this point it would seem reasonable to assume that with aggressive leadership and bold and imaginative new programs, the Canadian Forestry Service might take the lead in the environmental thrust with land-based renewable resources. With 75 years of experience, a nationwide organization boasting a staff of some 500 scientists and vast knowledge in both research and management of the forest resource, the Canadian Forestry Service might have been specially created to play a leading role in an area for which no comparable organization existed.

It had the credentials, too, and in terms that every citizen could see and understand. It had made substantial progress in controlling Dutch elm disease, which was laying waste the stately elms of eastern Canada. It was the only organization that had scientists who could adequately assess the ecological impact of the projected Mackenzie Valley pipeline. Urban forestry, an increasingly important issue in a country that will see 94% of its population living under urban conditions by the year 2000, was a special area of competence. Prebble had a strong hand to play.

However, when he turned to the future role of the Canadian Forestry Service, it was clear that Prebble was considering no new initiatives in forestry:

> "I think the role of the Canadian Forestry Service can be regarded as severalfold. First of all, I think the Canadian Forestry Service will be expected to discharge or rescue those programs of the federal government that relate to forestry. At the present time it is very largely a research involvement, but not exclusively, because there are some management operations that are carried out on federal lands under the administration of other departments, but done by us in agreement with those other departments.
>
> "I think it would also be the responsibility of the Canadian Forestry Service to respond to such problems that are encountered or anticipated by the provincial departments or by industry, or by our own Canadian Forestry Service staff; not only to the forested areas of Canada, but also to the use of those areas, whether for timber production, for recreation or what not.
>
> "And I think the third thing that can be said is that the Canadian Forestry Service should participate in those activities of the Department concerned with environmental protection, whether it had to do with the avoidance of pollutant discharges from mills through means brought about by research, or through the improvement of the specifications for protocols that relate to major developments such as highways or pipelines on federally controlled territory. . . ."

Environment Canada, however, was still having growing pains. Reorganization based on the experience of its first 18 months of operations went into effect on January 1, 1973, "to better respond to the demands for services. . . ." The Canadian Forestry Service would find itself another notch down the totem pole. Now there were three main components — Fisheries and Marine, Planning and Finance, and Environmental Services. Environmental Services, in turn, was made up of three subdivisions — the Atmospheric Environment Service, the Environmental Management Service, and the Environmental Protection Service. The Environmental Management Service was, in turn, subdivided into four components. Heading the list, and thus probably being a major part, was the Canadian Forestry

Service, followed by the Inland Waters Directorate, the Canadian Wildlife Service, and the Lands Directorate.

The Canadian Forestry Service took the reorganization in stride:

> "With the reorganization of the departmental headquarters, the Canadian Forestry Service (CFS) becomes an important component of the newly constituted Environmental Management Service. The CFS headquarters was also reorganized. A Director-General was appointed and a Program Operations Branch and a Program Development Branch established. The current Forestry Relations Branch was retained."

Ironically, Prebble was promoted to special adviser to the deputy minister, the job he had invented for his old rivals in the Forestry Branch. Now the chain of command went from the new director general of the Canadian Forestry Service to Assistant Deputy Minister A.T. Davidson, to Senior Assistant Deputy Minister Jean Lupien, to Deputy Minister Robert Shaw, to Environment Minister Jack Davis, who made no secret of his disillusionment with the leadership of the Canadian Forestry Service. In May 1974, with typical frankness, he said:

> "Since the latter part of the sixties, there has been a questioning of the relevance of scientific research, in contrast with the previous period of giving scientific research free rein without much questioning about how it served a specific purpose. Now we want to be able to see just what purpose it serves. We are not doing away with research, but we want it directed more to specific goals. A great trouble with scientists is their inability to communicate with people outside their own field, to inform government about the validity and importance of their work in relation to the needs of government.
>
> "With respect to Forestry, our research budget compared to the value of the resource to our economy is far too low; the investment of industry and the provinces is even lower. They should be spending a far greater amount in research. After all, the provinces own the resource and have the administration. We have no say in that, and our concern is resented jealously by the provinces. When you talk about a national policy on forestry, the expression is rather meaningless, since we have no effective national role. The Canadian Forestry Service has lacked effective leadership. . . . We need more developers and less scientists. There are plans for a National Forestry Conference some time in the next 18 months. Perhaps at that time we will see a so-called national forestry policy developed."

The new director general of the Canadian Forestry Service, Dr. G.P. (Phil) Thomas, quiet-spoken and gentle in manner, epitomized the classical research scientist. A forest pathologist, he joined the federal government in 1947 as a research officer at the Dominion Laboratory of Forest Pathology in Victoria, British Columbia, when it was an element of the Department of Agriculture. In 1958 he went to Calgary to head the Forest Diseases Research Laboratory and in 1965 he became the first regional director for the Department of Forestry in the Alberta and Northwest Territories region. In 1969 he moved to Victoria to become director of the Pacific region, and in March 1972 he was appointed the first director general of the Canadian Forestry Service.

A man who thoroughly enjoyed all the challenges his job entailed, Dr. Thomas experienced a difficult initial period in Ottawa, which began with the downgrading of the

FIGURE 56. Dr. G.P. Thomas, director of the Canadian Forestry Service 1972–75. (Forestry Canada)

service and the elevation of his mentor, Prebble, to the post of special adviser. Thomas suffered a serious heart attack, which incapacitated him for 6 months precisely when the service was fighting desperately for its survival as a national entity. The assistant deputy minister, Davidson, was widely respected in the service for his awareness of the important role that forestry could play in environment, but he transferred to the Department of Northern Affairs. John Tener, former director of the Canadian Wildlife Service, became the new assistant deputy minister.

Then, just as 1973 ended to mark the 75th birthday of the service, a new and drastic reorganization was announced for the Environmental Management Service, of which the Canadian Forestry Service was one of four components. The essence of the reorganization was the establishment of the Environmental Management Service on a regional basis, with five regional directors general responsible, respectively, for the Pacific, Prairie and Northern, Ontario, Quebec, and Atlantic regions, operating from headquarters, respectively, at Vancouver, Edmonton, Toronto, Quebec City, and Halifax and reporting directly to the assistant deputy minister. Also reporting to the assistant deputy minister would be a director of administration, a chairman of an Environmental Assessment Panel, a director of Program Coordination, and the directors general of Lands, Inland Waters, the Canadian Forestry Service, and the Canadian Wildlife Service. This meant simply that the line authority between forestry service headquarters and the regional forest research centers had been short-circuited through the regional directors general direct to the assistant deputy minister. The director general of the Canadian Forestry Service would still retain control of his headquarters apparatus, and the directors of Program Coordination, Program Development, and Forestry Relations of the Canadian Forestry Service would still report to him, along with the directors of the various institutes.

After the initial shock and some discussion, Thomas reported to establishment and headquarters directors that the main features of the new organization would be as follows: the Environmental Assessment Panel, while part of the deputy minister's office, would remain in the Environmental Management Service as part of the assistant deputy minister's office; regional environmental assessment panels would not be set up immediately; the new Policy and Program Coordination Directorate of the EMS would be small — eight or nine professionals — so that there would be little or no change in the Canadian Forestry Service headquarters staff; the new directorate would have a matrix rather than a branched organization, made up of a team with specific kinds of expertise; the new regional directorates would be small and thus dependent on the regional research centers; and the regional directors general and the director general of the EMS Policy and Program Coordination would depend heavily on the Canadian Forestry Service headquarters and regional staff for all aspects of program planning, coordination, evaluation, budget planning, etc. for the Canadian Forestry Service program. Therefore the Canadian Forestry Service identity would be strong and visible.

The inspiration for the reorganization had come from the minister himself. Davis wanted to be able to find one man in each region responsible for whatever environmental problems developed there. To provide him with quick answers, his department was reorganized accordingly. If this meant the diffusion of line authority in any one aspect as, for instance, in forestry, it seemed a small loss, particularly in the absence of a national forestry policy.

As of August 1974, the Environmental Management Service was headed by Dr. John S. Tener as assistant deputy minister, and B.J. Eagen was director of administration.

Director general of the Policy and Program Development Directorate was Dr. G. Fleischmann who had three directors under him, for Policy, Planning and Evaluation; Integration and Environmental Assessments; and Economic and Social Studies. In the Canadian Forestry Service, G.P. Thomas was director general; A. Bickerstaff, director of Special Studies; Dr. R.J. Bourchier, director, Program Coordination and Evaluation; Dr. D.R. Redmond, director, Forestry Relations; and Dr. H. Schwartz, director, Policy, Analysis and Development. The Inland Waters Directorate, Canadian Wildlife Service, Lands Directorate, and regional directorates made up the rest of the top structure.

The Western Forest Products Laboratory was included, along with the Pacific Forest Research Centre, in the Pacific and Yukon region, headed by G.B. Armstrong as regional director general. The western and northern region, which included the Northern Forest Research Centre at Edmonton, was headed by Dr. A.H. Macpherson. The Ontario region, including both the Great Lakes Forest Research Centre and the Eastern Forest Products Laboratory at Ottawa, was headed by L.A. Smithers, who had been head of the Great Lakes Forest Research Centre. The Quebec region, which contained the Laurentian Forest Research Centre, was also headed by a forestry representative in Dr. M. Lortie. The Atlantic region, which contained both the Maritimes Forest Research Centre at Fredericton and the Newfoundland Forest Research Centre at St. John's, did not yet have a regional director. Nor had a director of national forestry institutes yet been selected. Dr. J.J. Fettes was director of the Chemical Control Research Centre; D.E. Williams, director of the Forest Fire Research Institute; Dr. L. Sayn-Wittgenstein, director of the Forest Management Institute; J.C. Macleod, director of the Petawawa Forest Experiment Station; and Dr. J.M. Cameron, director of the Insect Pathology Research Institute at Sault Ste. Marie.

A remark by Arthur Bickerstaff in July 1973 seems particularly appropriate at this point:

> "I think that the federal government wastes millions of dollars on unnecessary reorganizations. However, apart from that, I've been through enough reorganizations now that I always reassure my staff when something takes place. I say: 'Don't worry about it; if it doesn't work, somebody will change it next year. If it does work, well, maybe it will last two years; but let's get on with the job.' So I would say that, well, in the present situation the Forest Management Institute hasn't suffered particularly through any changes in organization over the past five years or so. But I do feel that the Canadian Forestry Service, as such, has suffered a great deal."

So the last chapter in this 75-year history of the federal forestry service came to a close. It was fully as eventful as the first, though in a very different context.

# 33. Summary and Conclusions

We have traced the story of the federal forestry service through 75 years. We have seen it modestly begun in 1898 with a $1000 appropriation and the fortunate appointment of a singularly gifted first superintendent of forestry. Elihu Stewart, a onetime politician and lifetime land surveyor and later a pulp mill president, publisher, writer, and public speaker, played a major role in developing a forestry movement in Canada, which included the establishment of the Canadian Forestry Association, the *Canadian Forestry Journal*, the Canadian Society of Forest Engineers, and the organization of the Canadian Forestry Convention in 1906. He also organized the Forestry Branch of the Department of the Interior, selected a highly competent group of people to staff it, and took over the management of more than 1 214 000 ha (3 million acres) of forest land in the Canadian West. He was a man of great vision who called for a scientific approach to forest management, the initiation of sustained yield in harvesting timber, and the development of a national forest policy. The call for such a policy would go unanswered for the entire 75 years under review.

Stewart was succeeded by a man of completely different background but of identical view and perspective. R.H. Campbell was the prototype of a great civil servant, being in government service for many years but retaining the vigor and independence of an original mind. He continued and expanded the programs that Stewart had outlined. He also implemented Stewart's call for the scientific approach, supported the establishment of forestry schools in the universities, initiated the first mensuration and growth and yield studies at Petawawa, and worked closely with the Commission of Conservation, whose forest scientists he would eventually absorb into the Forestry Branch when the commission was dissolved. Campbell foresaw that the Forestry Branch would eventually be required to turn over the management of the western forest resources to the respective provinces, and he also saw that the role of the Forestry Branch would lie increasingly with research. He was involved closely in developing this new orientation in activities when an accident and death terminated his fruitful career.

Campbell, in turn, was succeeded by E.H. Finlayson, the first qualified forester to head the service. Finlayson was essentially a manager; he was content to look after the forests in the western provinces and hope that they would never have to be turned over to the provinces. Yet he knew from as early as 1926 that this would happen. He fought to save at least the reserves, but he did not push in the direction that Campbell had clearly indicated — towards forest research. On the contrary, he discouraged it, and this failure left the service exposed to the 1930 budget cuts. Furthermore, he was incapable of rallying any outside support in this time of crisis. How effective that support could be was shown dramatically when the Western Forest Products Laboratory, on its own initiative, alerted the British Columbia forest industry to the drastic cuts in staff that were being made, and the response of the industry was such that the cuts had to be revoked. Finlayson was a fighter; but he fought the wrong battles, and his futile fight undoubtedly contributed to the final tragedy of his life.

D. Roy Cameron, Finlayson's successor, also came up through the service and was a qualified forester. In many respects, his career had run parallel to Finlayson's: he had been active in the railway belt of British Columbia when Finlayson was organizing the service in Alberta. The men differed greatly in personality and in outlook. Finlayson had been an expert fire fighter, and he spent most of his life fighting fires of one sort or another; he was a tough, rugged man who liked nothing better than a good fight. Cameron was cool and thoughtful and had a fine feel for organization. Unfortunately, the extra duties he assumed in World War II and in FAO prevented the service from capitalizing on his undoubted abilities; and its loss was FAO's gain. Cameron was the kind of leader the service should have had in times of crisis. He was strongly research-oriented, had a fine political sense, and he knew how to call upon friends in high places when necessary.

Cameron was succeeded by D.A. Macdonald, another qualified forester and a graduate of the rough-and-ready operation in the western provinces. In temperament, he resembled Finlayson, but in the subtlety of his thinking and in his political know-how, he resembled Cameron. Macdonald was the first chief since Campbell to see clearly that the forestry service required a dual role — research and operation. He was the driving force in the National Forestry Program, which offered a brilliant example of how well the service could accept and handle a challenge with outstanding results. He was also the driving force behind the Canada Forestry Act, which for the first time since 1930 offered the legal basis for an operational role and the opportunity to coordinate and lead the development of forestry in Canada. Macdonald pushed for a truly national forestry role for the service and might have finally led it to a national forest policy. When he retired, the service was on the verge of its greatest challenge and greatest opportunity.

J.D.B. Harrison followed Macdonald, and in many respects he was the ideal man for the delicate negotiations involved in raising the service from the status of a branch to that of a department and, at the same time, taking over the Forest Biology Division from the Department of Agriculture. Harrison was a fine organizer and knew all the policial bases that had to be touched — governmental, industrial, and provincial. How the transition was brought about is surely one of the most intriguing episodes in the 75-year story. The Department of Forestry Act of 1960 was the culmination, confirming the powers bestowed by the Canada Forestry Act and providing the staff and apparatus for the playing of a new and greater role.

How did the service manage to fumble the ball in the next 14 years and, in fact, manage to fumble itself almost out of the ball park? Some future historian will have a better perspective for answering this question than someone actually witnessing events occurring even as this is being written. One thing, however, is clear: some of the seeds of disaster were sown during Harrison's leadership. It was Harrison who killed the rate-of-growth surveys, which gave the service national status. It was Harrison who defined the Forest Research Branch's role as purely one of research and resisted any efforts to develop operational activities. It was Harrison who failed to encourage the service to set an example regarding the national inventory, into which so much federal money was poured with inconclusive and inaccurate results. Despite his many outstanding qualities, Harrison did not have the vision of Stewart, Campbell, or Macdonald.

In drawing up a balance sheet for the period from 1962 to 1973, it is necessary to assess the individual contributions of the two ministers, Sauvé and Davis. Sauvé seems to have started out as the ideal minister of forestry, full of drive and enthusiasm, influential with his prime minister, and successful in cementing good relations with the provinces. But he lost his enthusiasm for forestry; he said there were no problems and the action lay with operations like ARDA. He promised at the National Forestry Conference at Montebello to work out a national forest policy, but none was forthcoming. By the time Davis succeeded him, the term was close to being a joke: Davis referred to it as the "so-called national forest policy." Were the ministers at fault? Ministers are transitory figures in government departments who depend on the advice and information of the senior civil servants in their departments; the health or ills of a department result largely from the qualities of leadership offered by these civil servants and from their sense of vision and purpose.

Another aspect of the problem that must be considered is the obvious question, Why, in 75 years, has a national forest policy never been worked out and stated? The answer seems to lie in another question: Why has it been so difficult to work out any national policy regarding natural resources in Canada? One is left then to consider the nature of Confederation and the terms of the British North America Act, which placed the natural resources within the jurisdiction of the provinces and left the working out of national policies concerning those resources to be solved by later governments. The usual answer of a federal politician to questions about national policies regarding natural resources is that they are a provincial matter. When national emergencies develop concerning one of these natural resources, improvised action is taken by the federal authority and some sort of national policy is developed. But, because of our great talent for compromise, we never really state the policy as such and thereby avoid further strain on the uneasy partnership embodied in the terms of Confederation.

Of course, beyond the problems of leadership and policy that the federal forestry service has faced are its solid achievements in almost every phase of forestry and the remarkable personalities who brought them about. Ross, Craig, Mulloy, Robertson, Halliday, Claughton-Wallin, Candy, W.G. and J.G. Wright, Beall, Tunstell, and Seely are among the foresters; among the forest biologists are Swaine, Gussow, Craigie, Balch, de Gryse, Pomerleau, Prebble, and the Hoppings (father and son). In the ranks of the forest products scientists, whose savings to the forest products industry would easily exceed the funds the federal government has devoted to forestry, are Fritz, Hale, Jenkins, and Greaves, among many others. None of these names include those who, in 1973, were writing new chapters in scientific forest and forest products research.

Whatever the future of the federal forestry service, nothing can erase these achievements, a lasting legacy of people who held a deep belief in the value to Canada of her forest land and who expressed that belief in their life work.

# 34. Federal Forestry Events, Ministers, and Directors

## Events

| | |
|---|---|
| 1884 | Forestry commission appointed |
| 1898 | Commission expanded into branch |
| 1899 | Elihu Stewart appointed inspector of timber and forestry (beginning of federal forestry service) |
| 1906 | Dominion Forest Reserves Act |
| 1907 | Forestry Branch includes Irrigation |
| 1908 | Foresty Branch includes Irrigation and Dominion parks |
| 1909 | Commission of Conservation |
| 1911 | Forest Reserves and Parks Act |
| 1923 | Dominion Forest Service |
| 1930 | Forests transferred to Prairie provinces |
| 1949 | Canada Foresty Act |
| 1960 | Department of Forestry Act |
| 1960 | Forestry Branch of Department of Northern Affairs and National Resources, and the Forest Biology Division of the Science Service in the Department of Agriculture combined to form the Department of Forestry |
| 1966 | Forestry Branch |
| 1969 | Canadian Forestry Service |
| 1984 | Minister of State (Forestry) appointed |
| 1984 | Canadian Forestry Service transferred to Agriculture Canada |
| 1986 | Minister of State (Forestry) becomes Minister of State (Forestry and Mines) |
| 1989 | Bill C-29 introduced to establish a federal department of forestry |
| 1990 | Royal Assent and proclamation of the Department of Forestry |

| **Year** | **Department Name** |
|---|---|
| 1873 | Interior |
| 1936 | Mines and Resources |
| 1950 | Resources and Development |
| 1953 | Northern Affairs and National Resources |
| 1960 | Forestry |
| 1966 | Forestry and Rural Development |
| 1969 | Fisheries and Forestry |
| 1971 | Environment |
| 1978 | Fisheries and Environment |
| 1980 | Environment |
| 1984 | Agriculture (Ministry of State Forestry) |
| 1986 | Agriculture (Ministry of State Forestry and Mines) |
| 1988 | Forestry (pending Royal Assent) |
| 1990 | Forestry |

## Ministers

| | |
|---|---|
| [1]July 1, 1873 – Nov. 5, 1873 | Alexander Campbell |
| Nov. 7, 1873 – Oct. 6, 1876 | David Laird |
| Oct. 7, 1876 – Oct. 23, 1876 | Richard William Scott (acting) |
| Oct. 24, 1876 – Oct. 9, 1878 | David Mills |
| Oct. 17, 1878 – Oct. 16, 1883 | Sir John Alexander Macdonald |
| Oct. 17, 1883 – Aug. 4, 1885 | Sir David Lewis Macpherson |
| Aug. 5, 1885 – April 21, 1888 | Thomas White (died in office) |
| April 22, 1888 – Aug. 2, 1888 | Vacant |
| Aug. 3, 1888 – June 6, 1891 | Edgar Dewdney |
| June 16, 1891 – Oct. 16, 1892 | Edgar Dewdney |
| Oct. 17, 1892 – Nov. 24, 1892 | Thomas Mayne Daly |
| Dec. 5, 1892 – Dec. 12, 1894 | Thomas Mayne Daly |
| Dec. 21, 1894 – April 27, 1896 | Thomas Mayne Daly |
| May 1, 1896 – July 8, 1896 | Hugh John Macdonald |
| July 13, 1896 – Nov. 16, 1896 | Vacant |
| Nov. 17, 1896 – Feb. 28, 1905 | Clifford Sifton |
| March 1, 1905 – March 12, 1905 | Vacant |
| March 13, 1905 – April 7, 1905 | Sir Wilfrid Laurier (acting) |
| April 8, 1905 – Oct. 6, 1911 | Frank Oliver |
| Oct. 10, 1911 – Oct. 28, 1912 | Robert Rogers |
| Oct. 29, 1912 – Oct. 12, 1917 | William James Roche |
| Oct. 12, 1917 – July 10, 1920 | Arthur Meighen |
| July 10, 1920 – Dec. 29, 1921 | Sir James Alexander Lougheed |
| Dec. 29, 1921 – June 28, 1926 | Charles Stewart |
| June 29, 1926 – July 12, 1926 | Henry Herbert Stevens (acting) |
| July 13, 1926 – Sept. 25, 1926 | Richard Bedford Bennett (acting) |
| Sept. 25, 1926 – Aug. 6, 1930 | Charles Stewart |
| Aug. 7, 1930 – Oct. 23, 1935 | Thomas Gerow Murphy |
| Oct. 23, 1935 – Nov. 30, 1936 | Thomas Alexander Crerar |
| [2]Dec. 1, 1936 – April 17, 1945 | Thomas Alexander Crerar |
| April 18, 1945 – June 10, 1948 | James Allison Glen |
| June 11, 1948 – Nov. 15, 1948 | James Angus MacKinnon |
| Nov. 15, 1948 – March 31, 1949 | James Angus MacKinnon |
| [3]April 1, 1949 – Jan. 17, 1950 | Colin Gibson |
| Jan. 18, 1950 – Sept. 16, 1953 | Robert Henry Winters |
| Sept. 17, 1953 – Dec. 15, 1953 | Jean Lesage |
| [4]Dec. 16, 1953 – June 21, 1957 | Jean Lesage |
| June 21, 1957 – Aug. 18, 1957 | Douglas Scott Harkness |
| Aug. 19, 1957 – Oct. 10, 1960 | Francis Alvin George Hamilton |
| [5]Oct. 11, 1960 – March 17, 1963 | Hugh John Flemming |
| March 18, 1963 – April 22, 1963 | Martial Asselin |
| April 22, 1963 – Feb. 2, 1964 | John Robert Nicholson |
| [6]Feb. 3, 1964 – April 20, 1968 | Maurice Sauvé |
| [7]July 6, 1968 – March 31, 1969 | Jean Marchand |

| | |
|---|---|
| [8]April 1, 1969 – Aug. 7, 1974 | Jack Davis |
| Aug. 8, 1974 – Dec. 4, 1975 | Jeanne Sauvé |
| Dec. 5, 1975 – Jan. 21, 1976 | Roméo LeBlanc (acting) |
| Jan. 22, 1976 – June 30, 1976 | Jean Marchand |
| July 1, 1976 – Sept. 13, 1976 | Roméo LeBlanc (acting) |
| [9]Sept. 14, 1976 – April 1, 1979 | Roméo LeBlanc |
| April 2, 1979 – June 3, 1979 | Leonard Stephen Marchand |
| June 4, 1979 – March 2, 1980 | John Allen Fraser |
| March 3, 1980 – Aug. 12, 1983 | John Roberts |
| Aug. 13, 1983 – Sept. 16, 1984 | Charles L. Caccia |
| [10]Sept. 17, 1984 – June 29, 1986 | Gerald S. Merrithew, Minister of State (Forestry) |
| June 30, 1986 – Sept. 14, 1988 | Gerald S. Merrithew, Minister of State (Forestry and Mines) |
| Sept. 15, 1988 – Dec. 6, 1988 | Gerry St. Germain, Minister of State (Forestry) |
| Dec. 7, 1988 – Jan. 29, 1989 | Frank Oberle, Acting Minister of State (Forestry) |
| Jan. 30, 1989 – Feb. 22, 1990 | Frank Oberle, Minister of State (Forestry) |
| Feb. 23, 1990 – present | Frank Oberle, Minister of Forestry |

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[1] Office of Minister of the Interior created by Statute 36 Vict., c. 4 and proclaimed in force on July 1, 1873.

[2] Offices of Minister of Mines, Minister of Immigration and Colonization, Minister of the Interior and Superintendent General Indian Affairs abolished and office of Minister of Mines and Resources created by Statute I Edw. VIII, c. 33, assented to June 23rd, 1936, and proclaimed in force Dec. 1, 1936.

[3] Office of Minister of Mines and Resources abolished and functions assumed by Ministers of Citizenship and Immigration, Mines and Technical Surveys, and Resources and Development, under provisions of Statute 13 Geo. VI, c. 16, 17, and 18, assented to Dec. 10, 1949, and proclaimed in force Jan. 18, 1950.

[4] Office created by Statute 2 Eliz. II, c. 4 (Department of Northern Affairs and National Resources Act, 1953).

[5] Department of Forestry created by Department of Forestry Act, 8-9 Eliz. II, c. 41 (1960), assented to Aug. 1, 1960, and proclaimed in force Oct. 1, 1960.

[6] Department of Forestry and Rural Development formed on June 16, 1966 under the Government Organization Act.

[7] Department of Fisheries and Forestry established on March 28, 1969 under the Government Organization Act.

[8] Department of the Environment established by act of Parliament July 1, 1971.

[9] Roméo LeBlanc was appointed Minister of the Environment on Sept. 14, 1976 and given the title Minister of Fisheries and Environment.

[10] Canadian Forestry Service transferred from Environment Canada to Agriculture Canada.

## Directors

| | |
|---|---|
| 1899–1907 | E. Stewart, superintendent of forestry |
| 1907–1923 | R.H. Campbell, director of Forestry Branch |
| 1924–1936 | E.H. Finlayson, director of Dominion Forest Service |
| 1936–1947 | D.R. Cameron, Dominion forester |
| 1948–1956 | D.A. Macdonald, director, Forestry Branch |
| 1956–1960 | Dr. J.D.B. Harrison, director, Forestry Branch |
| 1960–1962 | Dr. J.D.B. Harrison, deputy minister of Department of Forestry |
| 1962–1966 | Dr. L.Z. Rousseau, deputy minister of Department of Forestry |
| 1966–1967 | Dr. L.Z. Rousseau, deputy minister of Department of Forestry and Rural Development |
| 1965–1966 | Dr. M.L. Prebble, assistant deputy minister of Department of Forestry |
| 1966–1968 | Dr. M.L. Prebble, assistant deputy minister of Department of Forestry and Rural Development |
| 1969–1971 | Dr. M.L. Prebble, assistant deputy minister of Department of Fisheries and Forestry |
| 1972–1975 | Dr. G.P. Thomas, director general, Canadian Forestry Service |
| 1976–1981 | Dr. R.J. Bourchier, director general, Canadian Forestry Service |
| 1981–1983 | F.L.C. Reed, assistant deputy minister, Canadian Forestry Service |
| 1983–1985 | R. Herring, assistant deputy minister, Canadian Forestry Service |
| 1985–1988 | J.C. Mercier, associate deputy minister, Canadian Forestry Service |
| 1988–1990 | J.C. Mercier, deputy minister designate, Forestry Canada |
| 1990–present | J.C. Mercier, deputy minister, Forestry Canada |

# 35. Interviews

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Davis, J., May 7, 1974
Dwight, T.W., Oct. 3, 1972; Dec. 1973
Fritz, C., Oct. 4, 1972
Greaves, C., Oct. 17, 1972
Hale, J., Aug. 8, 1973
Halliday, W.E.D., Sept. 18, 1973
Harrison, J.D.B., Nov. 28, 1972
Hopping, G.R., Aug. 2, 1972
Jenkins, J.H., Oct. 16, 1973
Keenan, W.N., Nov. 17, 1972
Macleod, J.C., Aug. 13, 1973
Miller, G.L., Aug. 3, 1972
O'Gorman, A., July 31, 1972
Place, I.C.M., Nov. 28, 1973
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Seely, H.E., Nov. 29, 1972
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## Forestry Canada

Forestry Canada is the main focus for forestry matters in the federal government. It provides national leadership through the development, coordination, and implementation of federal policies and programs to enhance long-term economic, social, and environmental benefits from the forest sector for Canadians.

Forestry Canada is a decentralized organization with six regions, two national research institutes, and seven regional sub-offices located across Canada. Headquarters is located in the National Capital Region in Hull, Quebec.

In support of its mandate, Forestry Canada carries out the following activities:

- administers forest development agreements negotiated with the provinces
- undertakes and supports research, development, and technology transfer in forest management and utilization
- compiles, analyzes, and disseminates information about national and international forest resources and related matters
- monitors disease and insect pests in Canada's forests
- provides information, analyses, and policy advice on economics, industry, markets, and trade related to the forest sector
- promotes employment, education, and training opportunities in the forest sector
- promotes public awareness of all apects of the forest sector.

Forestry Canada interacts regularly with provincial and territorial governments, industry, labor, universities, conservationists, and the public through such bodies as the Canadian Council of Forest Ministers, the Forest Sector Advisory Council, the Forestry Research Advisory Council of Canada, the Canadian Forest Inventory Committee, the Canadian Committee on Forest Fire Management, the Canadian Interagency Forest Fire Centre, and regional consultative committees. Forestry Canada is also active in international forestry agencies such as the International Union of Forestry Research Organizations and the Food and Agriculture Organization, as well as in technical and trade missions.

## Forêts Canada

Forêts Canada est l'organisme principal en matière de foresterie à l'intérieur du gouvernement fédéral. Chef de file sur le plan national, il assure la préparation, la coordination et la mise en œuvre des politiques et des programmes fédéraux dans le but d'améliorer les avantages économiques, sociaux et environnementaux à long terme offerts aux Canadiens par le secteur forestier.

Forêts Canada est une organisation décentralisée: six régions, deux instituts de recherche nationaux ainsi que sept sous-bureaux régionaux sont répartis dans tout le Canada. L'administration centrale est établie dans la région de la Capitale nationale, à Hull (Québec).

Pour remplir son mandat, Forêts Canada assume les tâches suivantes:

- il administre les accords de développement forestier conclus avec les provinces
- il entreprend et appuie la recherche, la mise au point et le transfert technologique dans le domaine de la gestion et de l'utilisation des forêts
- il rassemble, analyse et diffuse de l'information sur les ressources forestières nationales et internationales et les domaines connexes
- il fait des relevés des maladies et des insectes ravageurs des forêts canadiennes
- il fournit de l'information, des analyses et des conseils (quant aux politiques) concernant l'économie, l'industrie, les marchés et le commerce reliés au secteur forestier
- il favorise les occasions d'emploi et de formation universitaire et technique dans le secteur forestier
- il encourage les Canadiens à prendre conscience de tous les aspects du secteur forestier.

Forêts Canada entretient des rapports sur une base régulière avec les gouvernements provinciaux et territoriaux, l'industrie, le monde du travail, les universités, les environnementalistes et le public par l'entremise d'organismes comme le Conseil canadien des ministres des Forêts, le Conseil consultatif du secteur forestier, le Conseil consultatif de la recherche forestière du Canada, le Comité de l'Inventaire des forêts du Canada, le Comité canadien de la gestion des incendies de forêt, le Centre interservices des feux de forêt du Canada et des comités consultatifs régionaux. Forêts Canada joue également un rôle actif dans des organismes internationaux de foresterie comme l'Union internationale des instituts de recherches forestières et l'Organisation pour l'alimentation et l'agriculture, de même qu'au sein de délégations de nature technique ou commerciale.